

Report on the coal mines of the Monongahela river region from the West ...

J Sutton Wall

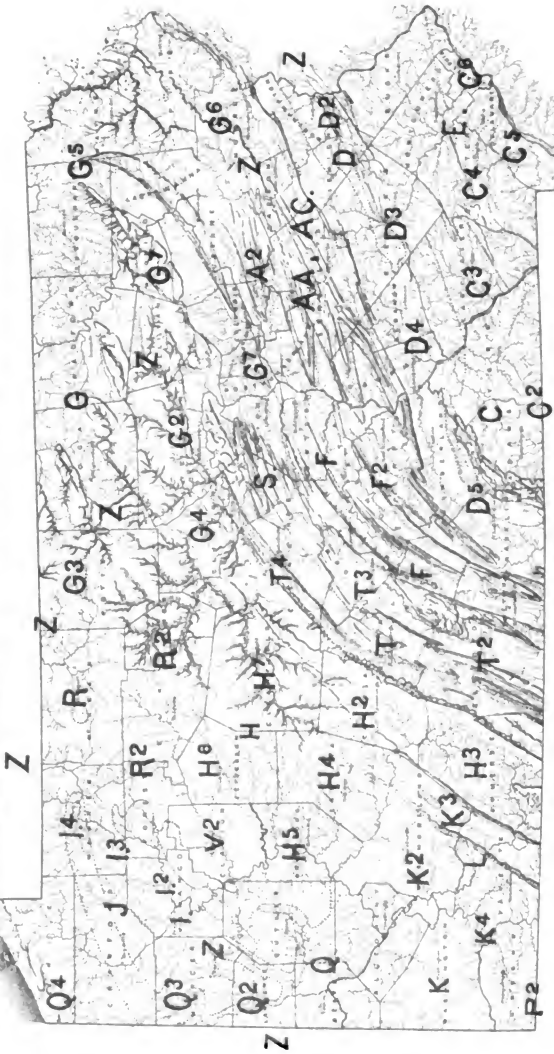
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Geological Reports of Pennsylvania, 1874-1884.



P.—Coal Flora. B, B', M, M', M',—Chemical Analyses.
 N.—Levels. O, O'.—Catalogue of Specimens.

SECOND GEOLOGICAL SURVEY OF PENNSYLVANIA.
REPORT OF PROGRESS K⁴

REPORT ON THE COAL MINES

OF THE 47102

MONONGAHELA RIVER REGION,

FROM THE WEST-VIRGINIA STATE LINE

TO PITTSBURGH,

INCLUDING THE MINES ON THE LOWER

YOUGHIOGHENY RIVER.

By J. SUTTON WALL.

PART I.
DESCRIPTION OF THE MINES.

WITH A MAP OF THE REGION, IN TWO SHEETS; 12 HELIOTYPE
PICTURES; 7 PAGE PLATE MAPS, AND 19 PAGE PLATE
SECTIONS OF THE PITTSBURGH BED.

HARRISBURG:
PUBLISHED BY THE BOARD OF COMMISSIONERS
FOR THE SECOND GEOLOGICAL SURVEY.
1884.

Entered, for the Commonwealth of Pennsylvania, in the year 1884, according
to acts of Congress,

By **WILLIAM A. INGHAM,**
Secretary of the Board of Commissioners of Geological Survey,
In the office of the Librarian of Congress, at
WASHINGTON, D. C.

Electrotyped and printed by
LANE S. HART, State Printer,
Harrisburg, Pa.

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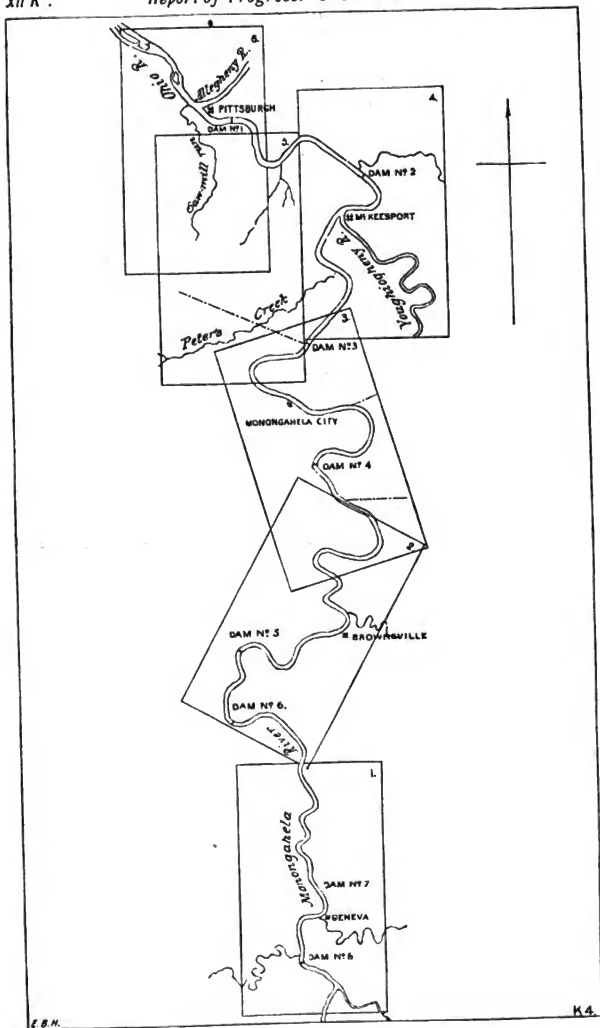
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LETTERS OF TRANSMITTAL.

To His Excellency Governor R. E. PATTISON, *Ex-officio*
Chairman of the Board of Commissioners of the Second
Geological Survey of Pennsylvania:

SIR: I have the honor to lay before the Board a report on the collieries of the Monongahela Valley, prepared by Mr. Wall, of Monongahela City, illustrated by maps and sections, and by a series of photographic views taken at my direction by Mr. E. B. Harden, Topographer of the Survey.

The map of the river valley in a pocket of the bound volume was constructed and drawn by Mr. Wall on the basis of the river survey made by Col. Milnor Roberts in 1838, and plotted by Mr. Felix R. Brunot in 1841. The side country has been added by Mr. Wall, as well as the locations of collieries, towns, villages, &c., from his numerous surveys in subsequent and recent years.

As this map will be removed from the book by many persons to hang upon a wall, I have directed Mr. Harden to copy it in sections, and insert the parts as page plates in the body of the work. The sections of the Pittsburgh coal bed, in groups of four to a page, have been drawn by Mr. Harden; to whom also I owe a careful proof reading of the whole work and the preparation of its index. In fine he has taken entire charge of its publication.

I hope to have another report from Mr. Wall upon the internal structure of the Pittsburgh coal bed, summarizing the data scattered through the present report, and describing the mining experience of the region. But no advantage would accrue from delaying the publication of his observations at the different collieries along the river of facts the value of which will be well appreciated by the citizens of that part of the State.

Very respectfully,

J. P. LESLEY.

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MONONGAHELA CITY, PA.; *Sept. 10, 1884.*

Professor J. P. LESLEY,

State Geologist, Philadelphia, Pa.:

DEAR SIR: I herewith take pleasure in submitting to your consideration and approval Part First of my report on the Monongahela River Collieries, prepared from observations and examinations made in accordance with your instructions of June 24, 1881.

This report contains detailed descriptions of all the coal mines now in operation in the Monongahela Valley, together with a brief history of many of those that have been in operation, but are now suspended. I have also included those mines in the Youghiogheny Valley that were in operation during the existence of the Slack-Water Improvement on that river, and those that are still operating to the river trade by means of the slack-water formed in the lower portion of the river by Pool No. 2 of the Monongahela river; also those of the Saw-Mill Run region and the Peter's Creek Valley. To which is added under the heading of an "Historical Introduction" a brief history of the mining industry of the district, from the discovery of the coal to the present time, including observations on growth and development at various periods of its history, with a table of the annual shipments from the Monongahela river since 1844.

This report is also accompanied with an outline map of the Monongahela river, from the West Virginia State Line to Pittsburgh, showing the outcrop lines of the Pittsburgh Coal Bed, location of coal mines, locks and dams, railroads, &c., throughout that distance. In the preparation of this map, the Hon. Felix R. Brunot, of Allegheny City, has kindly granted me the use of the very excellent map of the Monongahela river made by him in 1841, the history of which is contained in the accompanying letter from him.

The chapter on "Coal Cleavage Planes" will be included in Part Second of this report, together with the several chapters on "Methods of Mining," "Machinery," "Statistics," &c.

I feel that an apology is due to yourself, as well as to the

public, for the protracted delay in completing this report, which you have entrusted to my charge, but I sincerely hope that what has been lost in time is now fully compensated for in matter obtained and presented.

I herewith beg to acknowledge my grateful thanks to the numerous friends of the work under my charge, who have freely contributed to its success, among whom it gives me pleasure to mention William M. Lyon and Joseph S. Morrison, of Pittsburgh; Theodore Woods, civil and mining engineer, of McKeesport; R. M. McKinney, civil and mining engineer, of Elizabeth; Thomas Hutchinson, of River-view; Hon. George V. Lawrence, George A. Linn, M. D., and Col. Chill. W. Hazzard, editor of the *Monongahela Valley Republican*, of this city; John S. Vanvoorhis, M. D., of Bellevernon; Dr. J. Allen Hubbs, of the U. S. Signal Service, at Brownsville; Major Thomas McGowan, Superintendent of Repairs for the Monongahela Navigation Company, of Lock No. 4, and the leading officials of the several railroad lines within the district.

I should also not omit to inform you that I have received the kindest attention and assistance from all the Coal Operators and Mine Superintendents in the district without exception. I am under special obligations to James Louttit, Inspector of Mines for the First Bituminous Coal District of this State, for his constant companionship and valuable assistance rendered during my examinations of the mines; also to R. S. D. Hartrick, E. M., of this city, for assistance in the office work, and to Edward B. Harden, C. E., of the Geological Survey, at Philadelphia, for the preparation of the maps, illustrations, and copious indices accompanying this report. And to yourself especially do I beg to acknowledge my most sincere thanks for the wise counsel, uniform kindness, and consideration so freely and promptly rendered to me at all times throughout the work.

With very great respect,

Your obedient servant,

J. SUTTON WALL.

PITTSBURGH, *Nov. 24, 1883.*

J. SUTTON WALL, *C. E.*,

Monongahela City, Pa.:

DEAR SIR: On my return home from work I find your favor of the 20th, making inquiries about a map of the Monongahela river made by me in 1841.

I was a rodman in the corps making the navigation surveys, and assisted in the office work afterwards, until the maps and drawings were all completed.

After leaving the employment of the Company, I borrowed the note-books and made from them the map to which you refer. The Company maps which I also helped to make, were on quite a large scale, the separate sheets being bound together. They were burned in the fire of 1845, with the note-books, except those I have in my possession for the above-named purpose. The original map drawn by me I gave to the Monongahela Navigation Company about twenty years ago, and subsequently it was lithographed for one of the annual reports. The scale was reduced in the lithograph to about one-half that of the original. My map hangs in the office of the Navigation Company, and no doubt Gen. Moorhead or Mr. Harlow, the Engineer of the Company, will take pleasure in showing it to you. The surveys were made under the direction of W. Milnor Roberts, civil engineer, in 1838; and the principal assistant in charge of the parties was Nathaniel McDowell, both now dead. I plotted my map with great care from the notes of the survey, and I think you may rely upon it as being perfectly accurate in all essential particulars.

Very respectfully, &c.,

FELIX R. BRUNOT.

HISTORICAL INTRODUCTION.

The exposure of the Pittsburgh Coal Bed, by erosion, for many miles along the Monongahela River and tributary streams, rendered it of easy access without material labor or expense, and led to its discovery and use by the pioneer inhabitants at an early period in the history of the valley.

The first recorded mention of the discovery and use of this coal, that has come under my observation, was by Colonel James Burd, who, in 1759, was sent with a detachment of two hundred soldiers by Col. Bouquet, then commanding at Carlisle, to complete the cutting of Braddock's road from a point east of Uniontown to the Monongahela River near the present site of Brownsville. He says, in his Journal under date of 22d of September, 1759: "This morning I went to the river Monongahela, reconnoitered Redstone, &c., and concluded upon the place for the post, being a hill in the fork of the river Monongahela and Nemo-calling's creek, (now called Dunlap's creek,) the best situation that I could find, and returned in the evening to camp. The camp moved two miles to Coal run. This run is entirely paved in the bottom with fine stone coal, and the hill on the south side of it is a rock of the finest coal I ever saw. I burnt about a bushel of it on my fire."* His notes of the following day inform us that this was at a point two and one half miles from the river. Colonel Burd, being a British officer, was no doubt well acquainted with the appearance and use of English coals, and thereby qualified to express a fair opinion of the quality of the coal that he found and used, which subsequent developments have fully confirmed.

* See *Sherman Day's Historical Collections of Pennsylvania*, page 336, &c.

It also appears that coal was mined from Coal Hill and used by the British Army at Fort Pitt, now Pittsburgh, while that place was under command of Col. Bouquet, soon after its evacuation by the French ; and at least as early as 1765, according to observations of the Reverend Charles Beatty, who visited the Fort in 1766, we find him saying in his Journal under date of Monday, September 8th, of the last named year: "In the afternoon we crossed the *Moccongehela* river, accompanied by two gentlemen, and went up the hill opposite the fort, by a very difficult ascent, in order to take a view of that part of it more particularly from which the garrison is supplied with coals, which is not far from the top. A fire being made by the workmen not far from the place where they dug the coal, and left burning when they went away, by the small dust communicated itself to the body of the coals and set it on fire, and has now been burning almost a twelve month entirely under ground, for the space of twenty yards or more along the face of the hill or rock, the way the vein of coal extends, the smoke ascending up through the chinks of the rocks. The earth in some places is so warm that we could hardly bear to stand upon it ; at one place where the smoke came up we opened a hole in the earth till it was so hot as to burn paper thrown into it ; the steam that came out was so strong of sulphur that we could scarcely bear it. We found pieces of matter there, some of which appeared to be sulphur, others nitre, and some a mixture of both. If these strata be large in this mountain, it may become a volcano. The smoke arising out of this mountain appears to be much greater in rainy weather than at other times. The fire has already undermined some parts of the mountain, so that great fragments of it, and trees with their roots are fallen down its face."*

It is also quite evident that the Penns had obtained knowledge of the existence of coal at Pittsburgh as early as 1769,

* See *History of Pittsburgh by Neville B. Craig*, pages 95 and 96, &c. The burning pits of Coal Hill are also made the subject of a paper read before the Historical Society of Western Pennsylvania at its meeting in Pittsburgh in 1879, by James P. Fleming, Esq.

and entertained some idea of its value, since we find that Thomas Penn, in a letter of instructions to his nephew, Lieutenant Governor John Penn, under date of January 31, of that year, says: "We desire you will order 5,000 acres of land to be laid out about Pittsburgh, including the town which may now be laid out, and I think from its situation will become considerable in time." On the following 12th of May he also writes to Mr. Tilghman respecting this survey, and says: "I would not engross all the coal hills, but rather leave the greater part to others who may work them."* The difficulties which soon followed between the mother-country and her colonies prevented these instructions from being obeyed.

In 1784, however, we find that the Penns, who still retained their proprietary interests in large tracts of Pennsylvania lands, including the "*Manor*" of Pittsburgh, completed the survey and plan of the town of Pittsburgh, which they had ordered to be done fifteen years before, "and in the same year sold the privilege of mining coal in the great seam opposite the town at £30 for each mining lot, extending back to the center of the hill."†

Arthur Lee informs us that the inhabitants at Pittsburgh were already using the coal at that time. He says in his Journal, under date of December 17, 1784: "The banks of the Monongahela on the west, or opposite side of Pittsburgh, are steep close to the river and about two hundred yards high. About one third of the way from the top is a vein of coal above one of the rocks. The coal is considered good and is burned in the town."‡

James M. Bailey, General Superintendent for the Pittsburgh and Castle Shannon Railroad Company, informs me that one of the oldest pits in Coal Hill is located in a small ravine about three hundred yards east of the Castle Shannon tunnel, and is known as the *Indian Pit*. "According to old tradition, the coal, when mined from this pit, was

*See a paper read by William J. Buck before the Historical Society of Pennsylvania January 4, 1875.

†See *Pittsburgh and Allegheny in the Centennial Year*, by George Thurston, page 8; also Craig's *History of Pittsburgh*, pages 185 and 186.

tied up in raw hides and rolled down the face of the hill to the river bottom land, where the teams could get at it, after which the empty hides were carried back up the hill to the pit."

William Robbins, who is now operating the *Robbins & Jenkins'* mine, informs me that his grandfather, Brintnell Robbins, who served as a Lieutenant in the Connecticut Line of Infantry during the Revolutionary War, settled in 1796 at a point on the east side of the Youghiogheny river, since called Robbins' Mill, and now known as Robbins' Station, on the Baltimore and Ohio railroad. He built a mill at this place, which was run by water from a dam in the river; and in 1796 he discovered coal of the Pittsburgh seam, in the hill facing the river, on his property; opened a mine and commenced to use the coal for smithing and domestic purposes.

George Shiras, sr., informs me that the brewery carried on at the Point at Pittsburgh by his father, George Shiras, was supplied with coal and coke from the Minersville region (since called Herron's Hill) by a Mr. Mossman, who operated a mine at that place in 1795. Mossman was succeeded by Stephen Wiley, who carried on the coal and coke business for a number of years, and supplied with coal George Evans' Steam-Mill and Mark Stackhouses' foundry and machine works, and various other establishments. The Bell Brothers, whose residence was near the first toll-gate on the Greensburg Pike, also carried on an extensive coal business, by wagons, from the Minersville region, owned at that time by the Widow Duncan. Mr. Shiras also says that the first green window-glass works in this region were erected, in 1795, by the late General James O'Harra and Major Isaac Craig, at Manchester, now Allegheny City, just below the residence of the late John Sampson. These works were abandoned in a short time, for the reason that no coal could be obtained on that side of the river. General O'Harra then erected two similar works, on the south side of the river, in 1802, which were carried on by him until 1819, and then sold to Frederick Lorenz. The works were supplied with coal from a pit near the top of Coal Hill facing the works. The coal

was hauled down the hill on a kind of sled-car, then made with two oak saplings framed together so as to form shafts for the horse to work in, and a box fastened on to the outer end of the shafts that would contain about fifteen bushels. The road was made with a rut cut on each side about ten inches deep for the ends of the saplings to run in, while the sled-car was being hauled up and down the hill, answering the purpose of the modern rail. The grade of the road was so steep that the main labor of the horse consisted in hauling the sled-car from the works up the hill to the pit mouth. The mud in the ruts answered the purpose of a lubricant in hauling the loaded car down the hill. This was a primitive arrangement for the transportation of coal, but it is reported to have answered the purpose well. The coal-pit caught fire and burned for a number of years.* The Chess and Boggs families then supplied the works with coal from Saw-Mill run.

The late Jacob Beltzhoover hauled and ferried large quantities of coal across the river from Coal Hill to Pittsburgh prior to the erection of the Monongahela Bridge.† His pits faced the river and also Saw-Mill run. The first shipment of coal from Pittsburgh appears to have been made in 1803, by a French Company of Merchants under the firm name of John Tarascon Bros. and James Burthoud, who, during that year, built the ship *Louisiana*, of 350 tons' burden, and "sent her out ballasted with stone coal, which was sold at Philadelphia for 37½ cents per bushel."‡

F. Cumming, in speaking of the appearance of Pittsburgh in 1807, says, under date of the 3d of February of that year: "Another cause of the unprepossessing appearance of Pittsburgh proceeds from the effect of one of the most useful conveniences and necessities of life which it enjoys in a pre-eminent degree, namely, fuel, consisting of as fine coal as any in the world, in such plenty, so easily wrought and so

* Major Hiram Callow informs me that he saw this pit still burning in 1842.

† This bridge was erected in 1818, and was destroyed by the great fire of 1845. It was then supplied by a wire suspension bridge in 1846, which was replaced by the present iron bridge in 1883.

‡ See *Harris' Directory of Pittsburgh* for 1837, page 277, and for 1841, page 10.

near the town, that it is delivered in wagons, drawn by four horses, at the doors of the inhabitants at the rate of five cents per bushel."

"A load of forty bushels, which costs only two dollars, will keep two fires in a house for a month, and, in consequence, there are few houses, even amongst the poorest of the inhabitants, where at least two fires are not used—one for cooking and another for the family to sit at. This great consumption of a coal abounding in sulphur, and its smoke condensing into a vast quantity of lamp-black, gives the outside of the houses a dirty and disagreeable appearance, even more so than in the most populous towns of Great Britain, where a proportionably great quantity of coal is used, which must be caused by a difference in quality which appears in the grate to be in favor of the coal of this country."*

The increasing wants of this new country for the manufactured articles of iron, glass, &c., which could then only be obtained from the east at great expense for transportation, together with the abundance of coal and iron ore within easy reach, gave an early impulse to manufacturing enterprises at Pittsburgh and along the Monongahela and Youghiogheny river valleys.

In the absence of more definite knowledge of the growth and extent of the coal business at this particular stage of its history, we can only learn approximately its development from the uses that were then being made of it. With that object in view, a slight digression here may be considered pardonable. Steam-power was now beginning to form an important factor in the mechanical economy of the district. We find that a steam flouring-mill was erected at Pittsburgh by Oliver and Owen Evans in 1809,† which was supplied with coal from the Minersville region, now included in Pittsburgh.

The first steamboat that navigated the western rivers was the *New Orleans*, built at Pittsburgh in 1811. She was sup-

* See *Sketches of a Tour to the Western Country*, by F. Cumming, page 62.

† See *Craig's History of Pittsburgh*, page 288.

plied with Pittsburgh coal, and made her first trip during that year.*

A rolling-mill was erected at Pittsburgh by Christopher Cowan in 1812, which was supplied with coal from the Minersville region.

Cramer's *Almanac* for 1814† says: "There are three extensive establishments for making steam engines in this place, 'The Pittsburgh Steam Engine Company' construct them on Oliver Evans' plan, 'The Mississippi Steam Engine Company' on Fulton's, and Bolton and Watts' plan, improved, are made by Thomas Copeland. The Pittsburgh Steam Engine Company have also erected a very extensive air foundry, and in the little town of Birmingham,‡ opposite Pittsburgh, Peter Kimmel has got one in operation. There are in addition two very large foundries, one owned by Mr. A. Beelen and Mr. J. McClurg." All of these establishments used Pittsburgh coal.

Cramer's *Almanac* for 1817 informs us, that the number of manufacturing establishments using steam-power had increased to eight in number, viz: Two steam grist-mills, one steam nail factory, one steam paper factory, one steam saw-mill, one steam woolen factory, and the several steam engine works. There were also four "air furnaces" in operation, "at which they cast all kinds of iron, from butt hinges to large sugar boilers, sugar rollers, machinery of every description, steam engines, and cannon of all dimensions, together with cannon balls." Two green and three white glass factories were now in operation. Manufacturing had also commenced at various points along the Monongahela valley. At Williamsport, now called Monongahela City, the manufacture of glass was in progress.

At Brownsville an extensive foundry and machine works were in operation, and a steam *cotton carding* and *spinning* factory. Coal of the *Pittsburgh bed* comprised the principal fuel in all these various establishments, and was usually supplied to the works from the neighboring hills.

* It is said she took on a fresh supply of coal at Cannelton, which had been mined by Roosevelt for that purpose during the year prior to the voyage.

† Published at Pittsburgh.

‡ Now South Pittsburgh.

The transportation of coal from Pittsburgh, in *flat* boats, was commenced by Thomas Jones in 1817.* George Shiras, sr., of Pittsburgh, in a letter to Wm. M. Lyon, under date of June 8th, 1884, says: "The first person that I knew to take coal down the Ohio river was 'Pilot Tom' Jones, son of Thomas Jones, who ran and owned the Ferry from the foot of Liberty street to his landing on the opposite side of the Monongahela river. Their pit was not far up the river from O'Harra's burning pit. The coal was brought down the hill in a 'sled-car,' driven by Pilot Tom, and placed in piles on the bank of the river during the winter, and in the spring when the *flat boats* arrived from French creek, Jones would purchase a pair, hire four or five stout young Irishmen, and have his coal wheeled into the boats, lay in a stock of provisions, jump aboard the boats with only the steering oars at bow and stern, cut loose, and not attempt to land until he reached Maysville, Kentucky, where he first commenced to make sales. And from this place he would take a fresh start for Cincinnati."

Daniel Bushnell informs me that Lewis Sweeney was also engaged in floating coal from Pittsburgh at an early day, he thinks contemporaneous with Thomas Jones.

Dr. John S. Vanvoorhis informs me, that the first coal transported from the vicinity of Monongahela City was in 1819. The coal was mined from a pit under the present cemetery, hauled by road wagons, to a point at the mouth of Pigeon creek, and loaded into a boat owned by Edward Kearney, after which it was floated to Pittsburgh. The boat was built by Isaac and Abraham Vanvoorhis, and measured forty feet in length by twelve feet in width, holding about seven hundred bushels.

Coal mining was commenced on a small scale in 1820, at points near Coal Centre, formerly called Greenfield. The coal was floated in small boats to Pittsburgh and towns on the Ohio river.

In 1830, we find a number of mines operating in a small way at Limetown, which are described in succeeding chapters

*Information furnished by Ephraim Jones, of Pittsburgh, a brother of Thomas Jones, now deceased.

of this report under the head of *Barr, John Finley, Cox, Jenkins, French, Reed, and Absalom Bentley* mines. They were mostly operated on the "stock-yard" plan.

The coal was usually mined during the winter season, screened or sorted in the mine with iron rakes, and the "lump" portion carted or wheeled out in hand-barrows, holding from five to seven bushels each, to the "stock-yard" on the river bank, where it remained until the river commenced to rise. It was then loaded into what was called "French-creek" boats by means of hand-barrows run on gangway planks extending from the river bank or stock-yard to the boats.

The "slack" coal possessed no market value, and was usually left remaining in the working places of the mines. Large dogs were often used to assist the miners in hauling the coal from the mines.

The boats were usually from 68 to 79 feet in length, 16 feet in width, and from $4\frac{1}{2}$ to 5 feet in depth, and, when loaded, would hold from four to six thousand bushels of coal. These boats derived their name from French creek, a tributary of the Allegheny river, where they were built for the purpose of transporting pig iron and other products of that region to Pittsburg. They then only consisted of the bottoms, studding, and one row of siding, but after reaching Pittsburg were sold to the coal men at about forty-five dollars each, and conveyed by hand-power to the various coal mines along the Monongahela river, where they were sided up ready for use at a total cost of one hundred dollars each. When loaded, they were provided with a steering oar at the stern, a gouger (oar) at the head, and two sweep oars on each side, and a crew of five men to each boat, including the pilot, who was also the captain. They were "run," or rather floated to market singly or in pairs of two boats lashed together with ropes, the principal care and labor of the boatmen being to keep the boats in the proper channel or current of the river. It required from seven to eight hours to reach Pittsburgh from Limetown, on a favorable stage of water, the distance being twenty-seven miles; and about five days to reach Cincinnati, a distance of four hundred and

sixty-seven miles by river. The pilot would receive twenty-five dollars for his services per trip, as far as Cincinnati, and the rest of the crew from ten to twelve dollars, and they often returned home on foot. The boats were sold with the coal, on account of the great difficulty and expense attending their return.

The price of coal in the Ohio river markets averaged about 12½ cents per bushel, although fluctuations from five to fifty cents per bushel were not uncommon, owing to the supply, which depended largely upon a favorable stage of the water in the river.

The shipping season was generally confined to the winter and spring rises, which did not often continue for more than a few days at a time.

A smaller class of *flat* boats were also used to convey coal to the Pittsburgh market, holding from 1500 to 3000 bushels. They were built at various points along the Monongahela river. Coal was also being mined at this time at Port Perry and Coal Hill for the river trade. From this time forward the advancement in the coal trade was quite rapid.

As an instance of the uncertainty of the price of coal at that period, Captain William Ferree informs me that, during the early winter of 1835, he took from Limetown to Cincinnati a pair of "French-creek" boats loaded with four thousand bushels of coal each, and received fifty cents per bushel for the coal, and two hundred dollars additional for the boats. Messrs. Hunter and Huff also took down a pair of boats each. The other boats that started for market, on that rise were sunk or stranded on bars, owing to a sudden fall in the water while they were on the way. He made sale of his coal on the evening of his arrival at Cincinnati, and on the following morning information was received that the river at Pittsburgh was again rising, which would enable the boats not sunk to get to market, and, on the basis of this report, the price fell to nine cents per bushel in a few hours.

In reference to the coal trade of Pittsburgh and vicinity in 1837, Isaac Harris gives, in his Directory of the City for

that year, the following list of coal mines operating in Coal Hill, with the number of men employed and the annual output of each mine :

No. of men.	By whom Owned.	Bushels, yearly.
30	George Ledlie,	480,000
35	Snowden & Philpot, 2½ miles up the river,	700,000
40	Leonard Semple & Co.,	500,000
20	James McGargill,	200,000
40	R. C. Stockton & Co.,	600,000
25	Lonargaus,	200,000
25	Lyon, Shorb & Co.,	260,000
40	Ormsby's,	550,000
25	G. & J. H. Shoenberger,	200,000
100	20 teams hauling, (120 horses,)	1,440,000

“ Which makes the quantity, from these sources alone, amount to 5,130,000 bushels, full half of which we believe is taken down the river. From Pittsburgh to Brownsville there are perhaps 35 to 40 coal railroads reaching into the coal region in the hills on each side of the river. At one time last fall it was reported that there were fifty large flat boats loaded and descending the river. With these facts we think the following estimate may be fairly made of the value and extent of the coal trade of Pittsburgh and the neighborhood:”*

“Mr. Lyford's estimate for amount consumed by the manufactories,	5,712,000 bushels.
For steam-boat supplies,	52,000 “
Amount consumed for domestic purposes,	3,625,000 “
Amount exported from Coal Hill,	2,565,000 “
Making a total of	<u>11,954,000</u> “

He estimates the coal to be worth five cents per bushel, and considers the above statement as fairly representing the magnitude of the coal trade of Pittsburgh at that time, exclusive of the amount shipped direct to the lower river markets, from mines further up the river.

In speaking of McKeesport, for 1837, in the same volume of the Directory, Harris says: “There are considerable shipments of coal from this point to supply the manufactories of Pittsburgh, as well as to all the intermediate points of

* See Isaac Harris' Directory of Pittsburgh for 1837, pages 175 and 176, &c.

trade from thence to the city of New Orleans. There are ten collieries in active employ on the banks of the Monongahela and Youghiogheny within one mile of the village, where about 2,000,000 bushels of the best bituminous coal are annually shipped at an expense of four cents per bushel, and resold at Pittsburgh at from five to six cents per bushel; at Cincinnati at from ten to twelve cents; Louisville from twelve to sixteen cents, and at the various points from the mouth of the Ohio to New Orleans, from twenty to twenty-five cents per bushel. From two to three hundred men, and as many boats, are steadily employed on these rivers in this trade. The coal merchants of McKeesport at this time are Major William Caven, J. Jeffers, Bailey & Whigham, Clark & Co., Stacy & Dunshee, Bell & Co., H. & J. Neil, McClusky & Co., Beal & Co., and J. J. Collins."

Captain Daniel C. Eaton informs me that George Ledlie was using mules to haul coal from the Bausman Mine as early as 1838, although hand-carts were still used at many of the mines then operating.

We are now approaching an event of great importance to the development of the coal interests of this region, namely, the building of locks and dams in the Monongahela river. In this connection I take the liberty of quoting what Colonel W. Milnor Roberts, then chief engineer of the works, says in his report to the Monongahela Navigation Company, under date of December 24, 1839, in regard to the advantages to be derived to the coal trade from the completion of this improvement:

"A single fact will show in a striking point of view the advantages likely to result to the coal trade upon the completion of the works now in progress. During the year 1837, a large number of flat boats were loaded at various points along the Monongahela, but, at that period of the season, when the owners wished to carry it to market, there was not sufficient depth of water on the ripples to enable them to float to the Ohio river. They were consequently compelled to remain, under a constant expense for watching and bailing, until near the close of the year; and when they at length succeeded in reaching the Ohio, many of them

were sunk and destroyed by coming in contact with the ice. The *loss* from this cause during that single year was estimated at forty thousand dollars. Had the Monongahela improvement been completed, they might have gone with safety, at a favorable period, and perhaps saved the whole of that amount. In October of last year there were 150 flat boats at the coal landings up the Monongahela river, which had then been waiting upwards of *three months* for a rise of water, in order to get to market. A flat boat usually carries 5000 bushels of coal, and requires five hands to manage it; but when lying at the coal landings, one or two men only are necessary to watch and pump it out. There were then 750,000 bushels of coal, with 200 men or more, together constituting a sinking fund for one fourth of the year. Estimating the coal only at five cents per bushel, there was the sum of \$37,000 lying as idle capital; and assuming that the men were paid one dollar per day for 90 days, there was the sum of \$18,000 actually paid out as a direct tax upon the coal. A trade which can afford to be thus harassed and taxed and still flourish, will readily pay at least a tithe of such expense to insure its safety and regularity, and may be considered a sure source of revenue to the Company. As the locks and dams are successively finished, the coal trade and the agricultural business of the flourishing counties of Allegheny, Fayette, Washington, and Greene will be gradually extended."*

Locks Nos. 1 and 2, although not entirely completed, were opened for navigation on October 18th, 1841. These locks consisted of one single chamber each, 190 feet long and 50 feet wide. Colonel W. Milnor Roberts, in speaking of the items of business done at Lock No. 1 during the eight weeks succeeding its opening to the trade, says in his report to the Navigation Company for 1840: "The amount of coal carried through the lock in this brief period does not fall short of 1,260,000 bushels or 41,500 tons."†

* See "Second Annual Report of the President and Managers of the Monongahela Navigation Company for 1839," page 30.

† See Annual Report of the Monongahela Navigation Company for 1841, page 13, &c.

In regard to the consumption of coal along the valley of the Ohio at this period, there are some interesting facts given in a work entitled "Cincinnati in 1841," which are herewith quoted from Col. Roberts' report. The author, in speaking of the consumption of coal in that city, says:

"The sales from the *coal yards* during the last year (1840) were *nine hundred and thirty thousand bushels*, and the probability is that the supplies, taken from boats on the river, which sell on their own account, would swell this amount almost or quite to *one million bushels* as the annual consumption for small manufacturing establishments and private families in the city. To this must be added the quantity required in the large iron works, city water works, &c., which I estimate to be as much more; one establishment alone consuming *ninety-five thousand bushels* of this article in a year. For this supply of coal the market depends principally on the regions of the Monongahela and Youghiogheny and the neighborhood of Wheeling."

Colonel Roberts further adds in the same report:

"Other cities along the great western waters (and especially New Orleans) consume a large amount of coal, and the demand is gradually increasing. Now, one effect of this improvement of the river (Monongahela) is, to *reduce* the cost of coal delivered at its mouth, which necessarily has a direct tendency to extend its use. In addition to the quantity used in the cities and towns, we have an immense and increasing consumption by the numerous steamboats on the Ohio."

Locks and Dams Nos. 3 and 4 were completed and opened for navigation on the 3d of November, 1844, which gave a continuous line of slack-water communication from Pittsburgh to Brownsville, a distance of 55½ miles, in which coal could be loaded and transported to Pittsburgh during nearly the whole year, except when the river was obstructed with ice. The assurance of a favorable stage of water, at least as far as Pittsburgh, throughout a large portion of the year gave an additional impulse to the coal industry of the valley, and a steady increase in production has been a marked feature of the trade from that time forward, except

during periods of war and general financial embarrassment.

The old method of floating coal to Pittsburgh was now supplanted by one more convenient and expeditious, that of small steam tow-boats, somewhat similar in construction to those of the present time. Coal mines were opened up in a more systematic manner, substantial tipples were constructed, and a marked change was inaugurated in all the operations pertaining to mining generally throughout the district. Mule-power was now being employed at nearly all the mines.

A change in the method of conveying coal to points below Pittsburgh was the next important improvement to follow, which marked further progress in the industry.

The transportation of coal to points below Pittsburgh by means of steam tow-boats was commenced in 1845. Capt. Daniel Bushnell owned a small stern-wheel boat, called the "Walter Forward," and in that year he made a trip to Cincinnati, taking three coal-flats, loaded with 2000 bushels each. Mr. Bushnell informs me that this was done to test the practicability of that method of transportation on the Ohio river, and to determine the question as to what could be done with larger and more powerful boats. He says the trip was attended with success, and did much towards dispelling popular doubts as to the practicability and profit of the plan. The coal-barges and boats were then fastened at the sides and in the rear of the tow-boat.

The late Judge Thomas H. Baird built a side-wheel tow-boat, called the "Harlem," in 1844. Also, two "model" barges, and in the following year commenced the transportation of coal with them from his coal mine (called the Baird mine) to Hanging-Rock, on the Ohio river, where it was used in the iron-works and blast-furnaces of that place. The return cargo consisted of pig-iron, which was delivered at Pittsburgh.

Hugh Smith built the steam tow-boat "Lake Erie" in the summer of 1849, and commenced to tow coal to the lower markets with her during the fall of that year.

Daniel Bushnell built the tow-boat "Black Diamond"

during 1849, and commenced to transport coal to Cincinnati with her in 1850, and subsequently to New Orleans. She was also a side-wheel boat.

Further experience in the matter of towing soon developed the fact that the bulk of the coal fleet should be placed at the bow of the tow-boat instead of the stern, and that the tow-boat should be used to propel and steer the fleet, instead of dragging or pulling it along.

Mr. Bushnell informs me that Capt. Jacob J. Vandergrift, now President of the United Oil Pipe Line, was pilot of the tow-boat "Black-Diamond" in 1850. This was the first trip with a coal fleet placed ahead of the boat.

The construction of Locks Nos. 1 and 2, on the Youghioghenny river, by the Youghioghenny Navigation Company, was commenced in the spring of 1850, and completed in the early part of the following year. Lock and Dam No. 1 was located one and a half miles below Alpsville, and Lock and Dam No. 2 at Buena Vista. This was followed by the opening of numerous coal mines along that river, for a distance of thirteen miles above its mouth, which were operated and produced large quantities of coal for the river trade, until the locks and dams were destroyed by high water and ice in 1866. The improvement was then abandoned, and only such mines continued to operate as could load coal in the back-water produced by Dam No. 2 of the Monongahela river.

All the coal run by water from the Youghioghenny since the completion of Dam No. 2, on the Monongahela river, has been run into Pool No. 2 of the last-named river, and is included in the reported shipments of Pool No. 2, together with the quantity actually mined in that pool.

Additional locks have been added at Dams Nos. 1, 2, and 3, of a larger size than the old ones, which greatly increases the facility for passing coal-boats from one pool to the other. Locks and Dams Nos. 5 and 6 were opened to navigation in November, 1856, and No. 7 is just completed.

The United States Government completed Lock and Dam No. 9, at Hoard's Rock, in West Virginia, one mile and a

quarter south of the Pennsylvania State Line during the summer of 1881, and are now proceeding with the construction of Lock and Dam No. 8, near the mouth of Dunkard's Creek, which will, when completed, connect with the Monongahela Navigation Company's Improvement, and give a continuous slack-water navigation from Pittsburgh to Morgantown, W. Va., a distance of one hundred and two miles.

The Pittsburgh coal-bed preserves a sufficient elevation above water-level for convenient mining operations throughout the greater part of this distance, and at no point is it so much beneath the river that it cannot be easily reached by shafting.

Tow-boats have been increased in size and power until there are now a few in the trade having a towing capacity of 20,000 tons, and capable of transporting from three to seven hundred and fifty thousand bushels of coal at a trip. Amongst the larger class we find the "Harry Brown," "J. B. Williams," "W. W. O'Neil," "John F. Walton," and others.

The various kinds of coal craft have also been increased in size. The following kinds are now used in the trade, namely: "Model Barges," holding from eighteen to thirty-two thousand bushels of coal; "Barges," holding twelve thousand bushels; "Coal-Boats," holding twenty-four thousand bushels; "Flats," holding thirty-five hundred bushels; "Deck Flats," holding from twenty-eight to thirty-four hundred bushels, and "Fuel Flats," holding from eight to ten thousand bushels.

The coal loaded into "Flats" is mostly sold to the Pittsburgh trade, and the larger class of Model Barges, Barges, and Coal-Boats, when loaded, are towed from the various up-river pools down to Pool No. 1, and sometimes below that into the harbor of Pittsburgh, where they are tied up and remain until the rivers rise sufficiently to enable them to pass safely to market.

A good boating stage is considered to be from nine to fourteen feet of water, as shown by the Pittsburgh gauge. It is for the purpose of providing a sufficient stage of water for

the harborage of coal-boats and other shipping interests of Pittsburgh, during the dry season, that the Davis Island Dam is now being built by the United States Government, at a point on the Ohio river five miles below that city. The dam is now completed and can be used, but the lock connected with it will not be open for transportation before the summer of 1885. This lock is said to be the largest one of the kind in existence. The chamber measures 110 feet in width and 600 feet in length, and will accommodate the passage of ten large coal crafts with fuel-boats and tow-boat all connected. The lock will only be used, however, for the passage of empty coal craft and boats up stream during low stages of water. The dam is formed of movable wooden wickets, so arranged that they can be raised and lowered at will. At a high stage of water they will be lowered for the passage of boats and coal fleets over them, and when the river falls, they will be raised so as to preserve a six-foot stage of water in the pool from the dam to Pittsburgh.

The great bulk of the coal that is transported to the markets below Pittsburgh, at this time, is taken from the collieries of the first four pools of the Monongahela river and the slack water of the lower portion of the Youghiogheny river. It is, however, in the harbor of the city of Pittsburgh where the coal fleets or tows are formed. These tows are usually made up of one tow-boat and from ten to fourteen loaded coal-boats and barges, together with from one to three fuel-boats filled with slack coal for engine fuel during the voyage. Of these coal-boats and barges, one is lashed to each side of the steamer, and the rest are placed in front, all securely tied together with rope cables and ratchet chains. Thus, the tow-boat being placed at the rear of the coal fleet, propels and steers it along with the current, instead of pulling or dragging it along, as might be inferred from the term towing, the popular expression for this mode of transporting coal to market.

Each of these tows when going as far as Cincinnati and Louisville require the services of a captain, (who sometimes acts as pilot,) two pilots, two mates, two engineers, six firemen, two cooks, one chamber-maid, and from eight to

twelve deck-hands; and to points below Louisville, the number of deck-hands is sometimes increased to fifteen.

On a good stage of water the time required to run from Pittsburgh to Cincinnati is from three to four days, and to Louisville it takes about one day more. The return of the empty craft requires from five to six days, depending upon the stage of the water. After reaching Louisville, the tow-boats and fleets pass over the falls intact, if there is sufficient depth of water to prevent the boats from striking the rocks, otherwise the boats are uncabled and towed through the canal, to a point below the falls, where more coal-boats and barges are added, which increases the fleet to from eighteen to twenty-eight pieces. Here the pilots are changed, and the fleet passes onward to more southern markets. The time to reach New Orleans from Louisville is from eight to ten days, under favorable weather, and to return with the empty craft requires about the same time—the whole distance from Pittsburgh being about two thousand miles.

The cost of transportation from Pittsburgh to Cincinnati, over this great water avenue, is about one cent per bushel, to Louisville one and a quarter cents, and to New Orleans about four cents per bushel, or \$1.32 per ton. And while this example for cheapness stands without a parallel in the history of inland transportation, the trade is still not without numerous embarrassments throughout its various branches. Most prominent amongst which are, protracted strikes of the miners, suspension of navigation by ice-bound rivers, together with the destruction of coal craft, loaded and empty, that often occurs during the breaking-up and movements of the ice, periods of low water, breakage of dams, and the fluctuations in market prices, produced by financial depression, overproduction, and other causes. Notwithstanding all these discouraging features, we find that the production still increases from year to year, and that the trade continues to show flattering signs of prosperity.

The following table gives the annual shipments from the several pools of the Monongahela river and the slack-water

portion of the Youghiogeny river since 1844 as compiled from the reports of the Monongahela Navigation Company :

YEAR.	Bushels.	Tons.	YEAR.	Bushels.	Tons.
1845,	4,605,185	174,997	1865,	89,522,792	1,501,866
1846,	7,778,911	295,598	1866,	42,615,300	1,619,381
1847,	9,645,127	366,514	1867,	30,072,700	1,142,762
1848,	9,819,361	373,135	1868,	45,301,000	1,721,438
1849,	9,708,507	368,923	1869,	52,512,600	1,995,479
1850,	12,297,967	467,322	1870,	57,596,400	2,188,663
1851,	12,521,228	475,806	1871,	48,621,300	1,847,609
1852,	14,630,841	555,972	1872,	54,208,800	2,059,934
1853,	15,716,367	597,222	1873,	55,113,495	2,094,313
1854,	17,331,946	658,614	1874,	65,881,700	2,503,504
1855,	22,234,009	844,892	1875,	61,409,000	2,333,542
1856,	8,584,095	326,195	1876,	62,395,000	2,371,010
1857,	28,973,596	1,100,996	1877,	72,702,800	2,762,706
1858,	25,696,669	976,473	1878,	69,938,255	2,657,654
1859,	28,286,671	1,074,893	1879,	62,015,300	2,356,581
1860,	37,947,732	1,442,014	1880,	84,048,350	3,193,837
1861,	20,865,722	792,797	1881,	86,254,660	3,277,677
1862,	18,583,956	706,190	1882,	101,434,700	3,854,518
1863,	26,444,252	1,004,881	1883,	108,487,800	4,122,536
1864,	35,070,917	1,332,694			

This table shows an aggregate of 1,566,875,011 bushels, or 59,541,143 tons, thus transported since 1844, to which, if 500,000,000 bushels be added for the quantity mined at Pittsburgh and in the valley prior to that date, and in Saw-Mill Run and Coal Hill since that date, and the quantity mined and shipped over the Monongahela Division of the Pennsylvania railroad since its construction and the aggregate quantity which has been mined and consumed for local and domestic purposes, not included in the amounts reported by the Navigation Company, we shall have 2,066,875,011 bushels, or 78,541,250 tons, which I consider to be a fair estimate of the quantity mined from the Monongahela and the lower portion of the Youghiogeny valleys since the commencement of mining operations. This represents the exhaustion of an area of over twenty thousand acres, or about thirty-two square miles, of the Pittsburgh coal-bed up to this time.

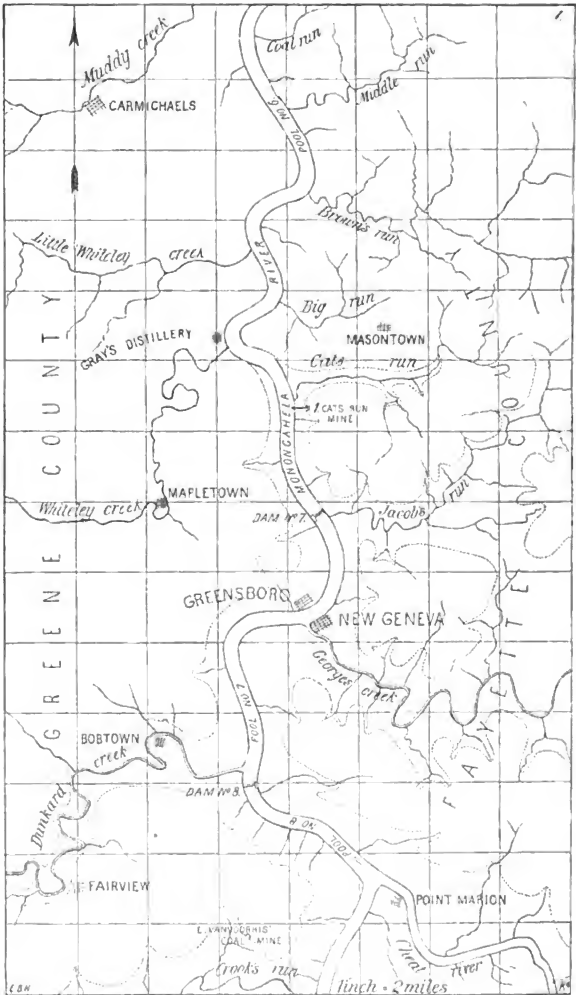
The shipments shown by the report of the Navigation Company for 1883 are 108,487,800 bushels, to which, if we add the quantity mined on Saw-Mill Run and its tributa-

ries, amounting to 8,504,930 bushels; also, the quantity mined and transported over the Monongahela Division of the Pennsylvania Railroad, amounting to 2,500,000 bushels; and the quantity mined and consumed for local and domestic purposes, not contained in the reports of the Navigation Company, amounting to 4,000,000 bushels per year, we shall have the aggregate quantity of 123,491,930 bushels, or 4,692,693 tons, for the production of the Monongahela Valley and its tributaries during that year, exclusive of the quantities mined and shipped from the Youghiogheny and Peters' Creek valleys by rail.

The natural gas developments in the Pittsburgh region is now attracting considerable attention from manufacturers. Its use has been commenced at a number of iron, steel, and glass works in Pittsburgh and vicinity with very flattering indications of its being a successful fuel. The gas appears, so far, to be in great abundance, and according to the reports from wells that have now been flowing for two years or more, it would seem that the supply is likely to continue for a number of years at least, but as to the precise length of time which they will continue to flow in quantities sufficient for all the purposes to which it is now being applied, is still a question of much speculation.

The inhabitants of the town of Washington, in this county, have already commenced to use the gas for domestic purposes. It is conveyed to their residences by pipes from a well recently drilled near the town.

It has already affected, to a considerable extent, the local coal trade of Pittsburgh and vicinity which has been mainly supplied by railroads, but the river trade has little to fear in that direction, since the greater bulk of its coal goes to markets beyond the present reach of the natural gas supply.



REPORT
ON THE
MONONGAHELA RIVER COAL MINES.

BY J. SUTTON WALL

CHAPTER I.

Mines above Pool No. 6.

From the State line to the mouth of Cat's run, a distance of ten and a half miles by river, the Pittsburgh Coal Seam is found at a sufficient elevation above water-level for successful mining operations.

Numerous pits have been opened in the seam along the river outcrop and tributary streams, and the coal mined out on a limited scale to supply a local demand for fuel coal for many years.

The absence of proper transportation facilities, such as railroads or slack-water, has very materially retarded the development of the coal interests of this entire region. It is, however, now confidently expected that this barrier will soon be removed by the early completion of Lock and Dam No. 8, which is in course of construction by the United States Government at a point near the mouth of Dunkard creek.

Lock No. 9, at Hoard's Rock, three fourths of a mile above the State line in West Virginia, was built by the U. S. Government in 1879.

Lock No. 7, one mile and three quarters above the mouth of Cat's run, was completed by the Monongahela Navigation Company in 1882.

Dam No. 8, when finished, will completely connect all of the slack-water improvements from Pittsburgh to Morgantown in West Virginia, and thereby furnish a safe and comparatively cheap means of transportation for coal and other commodities from that region during a large portion of each year.

Railroads are also being projected into and through the district, and it is highly probable that its extensive coal fields will be favored with a large development at an early day.

The coal is of an excellent quality for gas, fuel, and steam purposes, and it appears from tests already made that the coke compares well with the celebrated Connellsville coke. Its hardness and composition appear to be a medium between what is known as the Pittsburgh and Connellsville coals.

The great thickness of the seam is also a matter of considerable economic importance in its favor. At Elgy Vanvoorhis' pit in Greene county, I found the seam to measure *nine feet*, with an included slate parting of only one half inch at six feet from the bottom or under-clay. At a pit mouth on Dunkard creek, near Bobtown, and within the well-known Dunkard oil region, the same seam measures *eleven feet*, with a thin clay parting eight feet from the bottom. On the Fayette county side of the river I find the main coal member to average *eight and a half feet*, the over-clay being from two to eight inches, and the roof coal from *two to four feet*.

CHAPTER II.

Mines on Pool No. 6.

1. CAT'S RUN MINE, (85 miles from Pittsburgh.*)

The Pittsburgh coal bed descends beneath the river at the mouth of Cat's run, and continues beneath water-level nearly to the mouth of Ten-mile run.

A short distance above Cat's run, fronting Pool No. 6, and on the Fayette county side of the Monongahela river is a drift mine opened up in 1877, by Beall, Ewing & Co., who built sixty ovens, and coked the entire product of the mine.

In December, 1879, C. H. Armstrong & Son leased the works for a term of two years; built a crusher and washer, and sold nearly all the coke thus made at Ironton, Ohio.

Since the expiration of the lease, the works have remained idle, except to supply a small local demand for fuel coal. It is claimed that the coke was of good quality.

One and a half million bushels of coal is reported to have been taken from the mine.

The price of mining is the same here as in the Connells-ville region.

2. JACOBS' SLOPE MINE, (77½ miles from Pittsburg.)

Owned by Captain A. Jacobs,† and located in Fayette county, at Jacobs' Ferry, four and a half miles above Lock No. 6.

* All these distances are measured along the line of the river.

† Captain Jacobs informs me that he opened this mine in 1878 and 1879, simply for the purpose of determining the depth of the coal below the river bed, its thickness and character.

The slope is 389 feet in length from the surface, reaches the coal at a perpendicular depth of 155 feet, and 112½ feet below low water.

Main entry and air-course (driven 50 feet from base of slope) rise at the rate of one inch per foot so far as driven.

A sump entry was driven down the river, and dipped at the rate of one to ten.

About 10,000 bushels were mined out, and the mine is now filled with water.

Coal eleven feet thick, * capped with over-clay three inches, and over that a massive sand rock.

* As reported by Captain Jacobs.

CHAPTER III.

Mines on Pool No. 5.

From Ten-Mile run northward to beyond Black Hawk mine the Pittsburgh bed is above water level.

Descending the river from Lock No. 6, the first point where we find the coal at a sufficient elevation above water for convenient mining by *drifts* is at the mouth of *Ten-Mile creek*, which forms the line between the counties of Washington and Greene.

Here two pits have been opened in the seam, the bottom of which is five feet above water level. The coal passes under the creek bed at about one half mile from its mouth. A small quantity of coal was shipped from these pits by water, in 1865, by Davis and Waddle; but they are only operated at present to supply a local demand.

3. EVANS MINE, (63½ miles from Pittsburgh.)

On the Fayette county side of the river opposite to a point between Millsborough and Frederick, a pit is opened and operated on a small scale by Thomas Evans, who built a tipple in 1868, and runs the coal by water to supply a local demand at Brownsville and Rice's Landing.

On property belonging to the estate of Wm. Phillips, at the upper end of Frederick-town, there is a pit opened and
(5 K¹.)

operated on a small scale. The coal here is 55 feet above low water.

Between Frederick town and the mouth of Fishpot run are seven pits operated on a limited scale by M. Weaver, N. Rigdon, N. Burson, John Baker, F. Sinclair, Daniel Martin and Tyler Gester.

The coal is above water level for one fourth of a mile up Fish-pot run from its mouth, and rises in that direction.

At J. H. Vandegrift's distillery, one mile below the month of Fish-pot run, the coal is opened and used at the mill and distillery.

4. MAPLE GLEN MINE, (61½ miles from Pittsburg.)

This was opened in 1863, by M. Briggs, and operated for several years, and about 10 acres have been mined out. The coal was transported by river. Considerable quantities of the slack coal was made into coke.

The mine is not in operation at present, and is owned by W. G. S. Keene of Lynn, Massachusetts.

The bottom of the seam is 40 feet above low water.

At about four hundred yards below *Maple Glen Mine* is a pit owned by the Hormel estate, and operated under lease by Burns & Cartright, only to supply a local demand for the present ; and but little coal has been shipped from it by river. About one acre has been mined out.

5. BLACK HAWK MINE, (61½ miles from Pittsburgh.)

This mine, owned by Elisha Crouch, and operated under lease by W. O'Connell & Co., was commenced in 1853, and worked to supply a local trade for a number of years. A tipple was built in 1878, and since then the coal has been run to the lower river markets. They only load *coal flats*, and

the output amounts to 7000 bushels of lump coal per month. It is screened into two grades—lump and slack.

The cleavage planes at this mine are short and variable in direction. One observation gave N. $74\frac{1}{2}$ W.

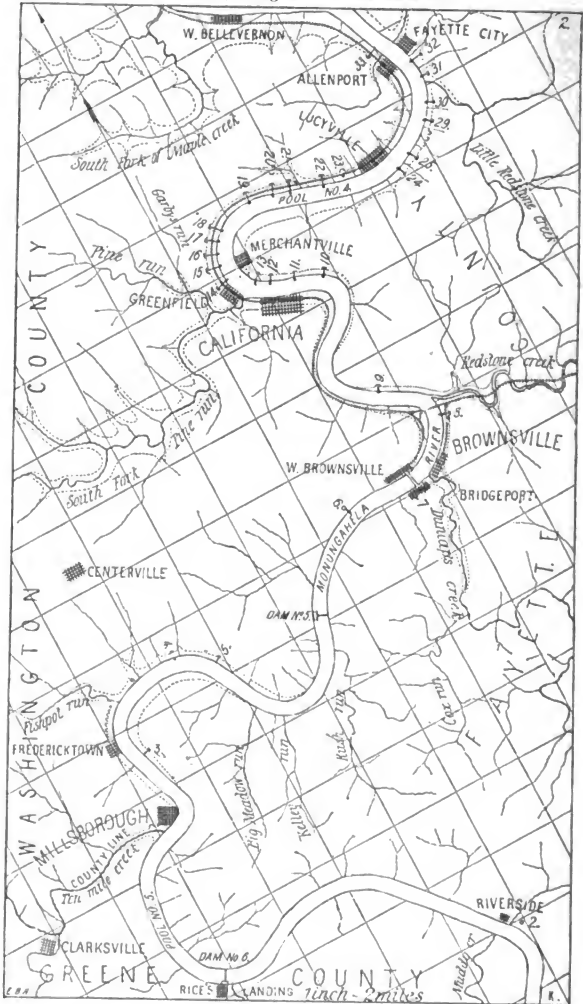
I made the following section of the bed :

	Sandstone.	
<i>Black Hawk Mine</i> <i>Section—(Fig. 1.)</i>	{ Carbonaceous shale,	2' 0"
	{ Roof coal,	1 0
	{ Over-clay,	1 0
	{ Breast coal,	4 6
	{ Parting,	$\frac{1}{4}$
	{ Bearing-in coal,	2
	{ Parting,	$\frac{1}{4}$
	{ Brick and bottom coal,	2 6

The bottom of the seam is 15 feet above low-water, passes under water-level half a mile farther down the river, and continues below water-level to beyond Lock No. 5, a distance of two and a half miles below the Black Hawk mine.

8 K'.

Report of Progress. J. Sutton Wall.



CHAPTER IV.

Mines on Pool No. 4.

6. KNOB MINE, (57 miles from Pittsburgh.)

Is located one mile above West Brownsville, in Washington county. It was opened up for Sloacum and Rodgers in 1878, by Eli Leonard (the coal being shipped by water), and operated by them until September, 1882, when the property was sold to the Knob Coal Company, consisting of Christopher Bakewell, John D. Bakewell, John H. Bakewell., S. H. Pearsall, D. H. Pearsall, Ashibald Smith, Thomas Hollowood, James Thornton, and James Rollison, present owners and operators.

The coal is reached by a slope shaft 190 feet in length and 68 feet in perpendicular depth.

The bottom of the slope is 300 feet from the river bank.

The bottom of the coal is 34 feet below water-level.

The tipple floor is 35 feet above medium water-stage. The coal is hauled in the mine to the foot of the slope by mules, and drawn up by a stationary engine and rope placed at the top of the slope or entrance to the mine.

The stationary engine at the top of slope is also made to do the pumping of water from the boats while under the tipple, by means of a rod and lever connection. The boiler at top of slope also furnishes the steam to run a pump in the mine near the bottom of the air shaft. The water flowing into the mine requires the pump to be run six hours per day through the summer season, and full time during the winter.

The superintendent is of the opinion that some water enters the mine from the river ; but since none of the workings are nearer to the river than 150 feet, that fact has not been positively determined.

The main entry and air-course are driven perpendicular to the faces or cleavage of the coal and parallel with each other, with 60 feet of solid coal between them.

The mine is worked on the *block system* ; room entries driven square against the butts and parallel with the cleavage, and 90 yards apart.

Sub-air-courses are driven parallel with the main entry and main air-course at a distance of 90 yards from them, and from each other.

The main entry is driven 500 yards. It dips from foot of slope for 200 yards, rises 17 inches in 75 yards, dips 4 feet in 150 yards, runs level for 25 yards, and dips rapidly to the head. The coal also dips down the river.

The rooms are driven 24 feet wide ; and the ribs between rooms are left 9 feet wide, which leaves 25 per cent of the coal in the mine.

The present production of the mines is 6,000 bushels per day, not counting nut and dust coal.

They only mine out the *breast* coal, and leave the *bearing-in*, *brick*, and *bottom* members undisturbed as a floor to the mine. But few clay seams, no horse-backs, and only a few binders are found.

The coal is screened into three grades ; lump, nut, and dust, in the proportions of 66 per cent lump, 17 per cent nut, and 17 per cent dust. The coal stands handling well, and looks well when mined.

They employ 75 miners, 16 day men, and use six mules.

The price of mining here is $2\frac{1}{2}$ cents per bushel at the present time.

The cleavage is frequent but short ; extends well through the members from bottom to top. Two observations on the cleavage planes gave : N. $65\frac{1}{2}$ W. 3 feet, and N. 70 W. 4 feet.

I obtained the following section in the mine :

Sandstone.			
Coal,		2' 0"	
Carbonaceous shale,		17 6	
<i>Knob Mine Section.</i> (Fig. 2.)	{	Coal,	6
		<i>Over-clay</i> ,	1 0
		Breast coal,	5' 9 to 6' 0"
		Parting, (slate),	$\frac{1}{2}$
		Bearing-in coal,	3
		Parting,	$\frac{1}{2}$
		Brick coal,	1 2
		Parting,	$\frac{1}{2}$
	Bottom coal,	1 9	
Calcareous clay with nodules of limestone.			

7. BRIDGEPORT SLOPE MINE, (56 miles from Pittsburg.)

Located in the town of Bridgeport, Fayette county, and owned and operated by William H. Miller, N. Crawford, and H. M. Crawford, this mine was opened in 1870, and only run to supply local demand.

The slope is 100 yards in length, and reaches the bottom of the coal at 12 feet above low water, and 33 feet below surface at pit mouth.

The main entry is driven perpendicular to the cleavage, and is 500 yards in length. This entry rises moderately toward the head.

The butt entries are driven mainly to the left from the main entry, on account of the dip in the opposite direction. These entries rise toward their heads.

The coal is hauled from the mine up the slope by stationary engine and a $1\frac{1}{2}$ inch hemp rope 300 feet long.

The water is drained through a drift cut from the mine to the river.

The present output is 100,000 bushels per year.

The property contains 50 acres of coal, and about eight acres has been mined out; and the buildings are all new and quite extensive for the purpose.

Price of coal delivered in the town \$6 per hundred.

Mines located in Brownsville.

The Oro mine, at the lower end of the town, owned by G. E. Hogg, and operated by Charles L. Snowden, is run to supply coal to the glass-works while they are in operation, say ten months in the year, requiring 2800 bushels of coal per week.

They also sell custom coal in the town during about nine months in each year, at the rate of 3000 bushels per week.

The Krepps mine, located on the east side of Dunlap's creek, and operated by F. Chalfant, also supplies coal to the town in considerable quantities.

8. UMPIRE MINE, (5½ miles from Pittsburg.)

Situated one fourth of a mile above the mouth of Redstone creek, on the Fayette county side of the river, it was opened up in 1863 by Thomas Tiernan, who built a tippie and run coal by river, for several years, until his death.

Zeph Carter then took charge of the mine and operated until 1864, when it was sold by the representatives of Tiernan's estate to Thomas Smith and H. H. Finley, who operated until 1866.

Smith then sold his interest to Finley, and W. B. Switzer became a partner with Finley in the works.

In 1873 Switzer sold his interest back to Finley, who conveyed the whole to John S. Cunningham and Lewis Abrams.

It now belongs to the estate of G. H. Bowman, deceased, and G. E. Hogg, and is operated under lease by C. L. Snowden & Co.

The old main entry is driven against the butts, from the river through to the creek, a distance of 1100 yards, and rises 15 feet in that distance.

The new main entry is quite crooked, and driven about S. 20° E., and the mine is worked somewhat on the block

system. *Butt entries* are driven 180 yards apart, and the air-courses are driven single, 100 yards apart. The *face entries* dip in a southerly direction at the rate of $1\frac{1}{2}$ inches per yard, and the coal rises (up creek) at the rate of 5 feet in 200 yards.

They bear in 6 inches above the bottom, and mine out all above that to the over clay, amounting to an average of $7\frac{1}{2}$ feet of coal. The following appears to be an *average section*:

Shale passing into sandstone.	
Umpire Mine Section. (Fig. 3.)	{ Over clay, from 0' to 2' 0''
	{ Breast coal, 5' 2''
	{ Parting, 0' $\frac{1}{2}$ ''
	{ Bearing-in coal, 0' 2''
	{ Parting, 0' $\frac{1}{2}$ ''
	{ Brick coal, 1' 2''
	{ Parting, 0' $\frac{1}{2}$ ''
	{ Bottom coal, 1' 8''
Limestone bottom, nodular.	

The *over clay* is quite variable in thickness, and in a considerable portion of the mine it is entirely absent.

They report the mine as producing 60 per cent of lump, 20 per cent dust, and 20 per cent nut coal.

One hundred and forty acres are reported to have been mined out up to this time.

I noticed a few clay seams and spars, but no soot veins.

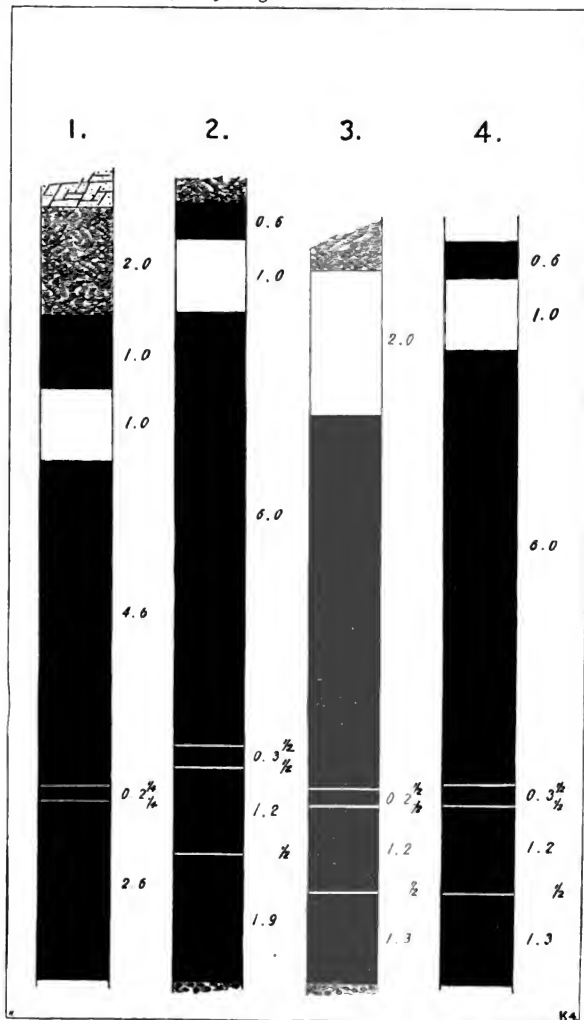
My observation on cleavage gave—	{ N. 70° W. 3 feet.
	{ N. 70 $\frac{1}{2}$ ° W. 2 feet.
	{ N. 76 $\frac{1}{2}$ ° W. 8 feet.
	{ N. 75° W. 4 feet.

The daily out-put is reported at 9000 bushels per day, with 85 miners, 8 drivers, 5 day men, and 8 mules.

Ventilated by a furnace with a stack of 58 feet in height. Now using the fourth tipple, which was built in 1869.

H. H. Finley built four coke-ovens, and G. E. Hogg built 16 more in 1876; and considerable quantities of coke were made from the dust coal taken from the mine, until last spring, when the coke tipple was carried away by high water.

The coke is reported to have been of good quality, and



was sold at Pittsburgh and Cincinnati at a moderate profit.

An analysis made at the Edgar Thompson Steel Works shows the coke to compare very favorably with the coke produced in the Connellsville region :

<i>Analysis of Umpire mine coke—</i>	{	Ash,	11.899
		Water, . . . . .	.313
		Sulphur, . . . . .	.798
		Carbon,	88.990
			100.000

9. CLIMAX MINE, (5½ miles from Pittsburgh.)

Located three fourths of a mile below the mouth of Redstone creek, in Fayette county.

Owned by Jonathan Forsythe, and opened up under lease by Lewis Leonard during the present summer. The first coal loaded into boats was on July 18th, 1883.

Entrance to the mine is by means of a slope (the coal being drawn up by a stationary engine and wire rope) 160 feet long, and at an angle of 14 degrees.

The bottom of the coal is level with lower water at pit mouth ; tipple floor 40 feet above low water mark ; depth of water under tipple at low water said to be eight feet.

This mine is worked on the *double-entry system*. The main entry and air course are driven parallel with each other, perpendicular to the cleavage or faces, with 50 feet of a rib of solid coal between them, and a distance of 150 yards to their heads at this time.

These entries are rising from the pit mouth.

Bull entries are driven double, with 25 feet of solid coal between them, to right and left of main entry.

The coal at pit mouth appears to be near the bottom of the synclinal, as the entries driven to the left or down the river are running about level, and the entries going to the right or up the river are rising at the rate of one foot in 50 feet.

The air shaft, located near the river end of the air course⁴ and 43 feet deep, is cut through rock and shale; circular in form; 7 feet in diameter, and cost \$2 00 per perpendicular foot.

The slope cost \$2 25 per lineal foot.

Ice-breakers and abutment are built 95 yards up the river from the tippie.

All of the entries are driven eight feet wide.

They only mine out the *breast coal* member, which is here six feet thick. The other portions of the section are the same as at the Umpire mine with respect to thickness.

<i>Climax Mine Section.</i> (Fig. 4.)	Roof coal,	from 0' to 6'
	Over-clay,	from 0' to 1' 0'
	Breast coal,	6'
	Parting,	½"
	Bearing-in coal,	3'
	Parting,	½"
	Brick,	1' 2"
	Parting,	½"
	Lower bottom,	1' 3"

The *over-clay* is absent in a good portion of the mine.

Rooms are turned off from the butt entries at intervals of 32 feet; room-pillars are left 15 feet thick before they are widened out; and the ribs between each room are left eight feet thick. This method of working the coal out gives ample support to all parts of the mine, and insures the safe working condition of the entries until the rooms are all worked out.

Mr. Lewis Leonard, the superintendent, informs me that the mine runs 67 per cent lump coal and 33 per cent nut and dust together. They have not, thus far, separated the nut from the dust, but expect to do so ere long.

The present output per day is 3000 bushels *by weight of lump coal*, for which alone the miners receive pay. They employ 40 miners and 4 day-men, work one mule and run 17 wagons.

10. GARROW MINE, (51½ miles from Pittsburgh.)

Located in Fayette county opposite to the upper end of the town of California and operated by Joseph Garrow is a slope mine, the main entry being driven against the butts, or parallel with the cleavage, to a distance of 610 yards from the pit mouth, the mine being worked on a combination of the block and double-entry system.

Mr. Garrow opened this mine in 1874 on his own property, worked out his own coal amounting to about twelve acres, and in May 1882, leased an adjoining tract belonging to John Dixon out of which he mined 774,311 bushels of lump coal.

The books of the mine show that in running 23,824 bushels of *lump coal* the *screenings* amounted to 10,401 bushels of nut and dust coal. They run the nut and dust coal all together here.

They mine out all but six inches of the bottom coal which is left undisturbed because the under-clay often becomes soft on exposure to the atmosphere and does not make a dry working bottom or floor.

This mine lies on the beginning of the west side of the synclinal or trough, the coal dipping to and up the river.

The bottom of the coal at the pit mouth is 16 feet above low water; and at the furnace (400 yards further up the river) 13 feet above low water.

The coal is hauled up the slope by a stationary engine and a $\frac{3}{4}$ -inch wire rope.

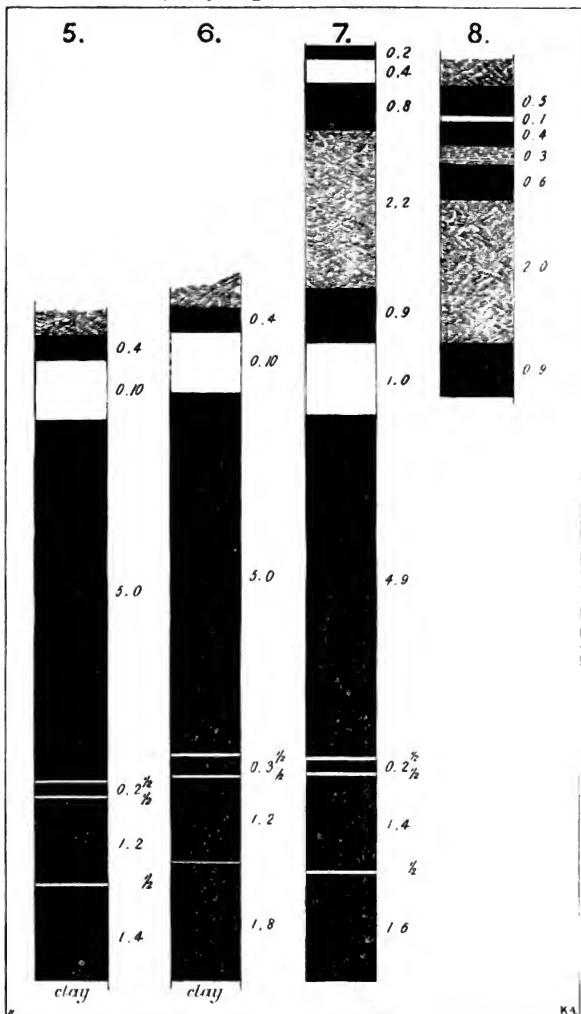
The boilers supply steam for working a syphon-pump at the boats.

The tippie is of the drop and shute form and 28 feet above low water.

Forty-five miners, 3 drivers and 5 day-men employed.

The present output of the mine is 5000 bushels per day.

The *cleavage* or faces are frequent but not uniform in direction and appear to have been disturbed by clay-seams and rolls in the floor of the mine. In one room I found a cleavage plane to bear N. $66\frac{1}{2}$ W. 3 feet long, and in 2 K'.



another room I observed two planes, one bearing N. 67½ W. 5 feet and the other N. 67½ W. 3 feet.

	Carbonaceous shale.		
Garrow Mine Section. (Fig. 5.)	{ Roof coal,	0'	4"
	{ Over-clay,	0'	10"
	{ Breast coal,	5'	0"
	{ Parting,		½"
	{ Bearing-in coal,		2"
	{ Parting,		½"
	{ Brick coal,	1'	2"
	{ Parting,		½"
	{ Bottom coal,	1'	4"
		Under-clay.	

11. CEDAR HILL MINE, (51½ miles from Pittsburgh.)

Belonging to the estate of Thomas Lilley, deceased, this was opened up under lease by Morgan and Dixon in 1870.

It is a drift opening and the main entry is driven perpendicular to the faces of the coal. The distance from butt entry No. 13 to head of main entry is 833 feet; and 75 feet more will bring it to the crop coal in the rear fronting on the other side of the river hill.

The main air course is driven parallel with the main entry 1000 feet farther up the river. Butt entries are all driven single. The air current is carried forward on the butt entries by cutting the heads of the rooms through to the entry until it reaches the air course. The main entry is rising from mouth to head, and the coal dips up the river at the rate of two feet in 150 feet. There are 14 butt entries with two more yet to drive. They have no furnace, but are arranging to build one at an early day. The shaft is already completed for the furnace and is 60 feet in depth, circular in form, and 6 feet in diameter. The air current at present is quite vigorous, but reported as not being uniform in velocity.

The present output of lump coal per day is 5000 bushels. They run lump, nut and dust coal in the proportions of 67 per cent lump, 20 per cent nut and 13 per cent dust coal.

They employ sixty-five miners, three drivers, one roadsman, inside boss, two outside men and one greaser.

The tract contained 128 acres, and about one half of it has been mined out.

Bottom of coal at pit mouth 20 feet above low water.

They mine out all except the roof and six inches of the bottom coal.

	Carbonaceous shale.	
Cedar Hill Mine Section. (Fig. 6.)	{ Roof coal,	2' to 6'
	{ Over-clay,	10'
	{ Breast coal,	5' 0"
	{ Parting,	$\frac{1}{2}$ "
	{ Bearing in coal,	3"
	{ Parting,	$\frac{1}{2}$ "
	{ Brick coal,	1' 2"
	{ Bottom coal,	1' 8"
	Under-clay.	

Cleavage planes in entry No. 13 bear N. 68 $\frac{1}{2}$, W. 3 feet ; N. 63 $\frac{1}{4}$, W. 9 feet ; N. 63 $\frac{3}{4}$, W. 7 feet.

12. LITTLE ALPS MINE, (51 miles from Pittsburgh.)

Formerly the *Budd Mine* ; situated in Fayette county opposite to the town of California, this mine was opened up by James Smith and M. Ward in 1871. The coal was owned by L. S. Miller and operated under lease by Smith and Ward until 1873.

Then the mine was leased to Crowthers, Musgrave & Co. who changed its name, rebuilt the tipple, and operated until 1879, when they sold the lease to Joseph Underwood and Joseph Good.

Main entry and air-course are driven against the faces or cleavage (with 30 feet of coal remaining between them) to a distance of 1000 yards from the pit mouth, where they stop 50 yards short of the outcrop at the north side of the property.

The main breast coal was the only part of the seam mined, and the overlying strata being light, the ribs between rooms were left quite thin. Sixty acres have been mined out and the coal is about exhausted.

Pit mouth 18 feet above low water ; coal rising to the north.

13. MERCHANT MINE, (50½ miles above Pittsburgh.)

This mine, opened up by William Forsythe about thirty years ago, has been operated successively by Meriam Chalfant ; Crow & Ward ; Forsythe and Furlong ; Forsythe & Bigley ; Crowthers, Musgrave & Co. ; Underwood, Leonard & Co. ; and recently by Bowdlen & Co. Sixty acres have been mined out and the coal is about exhausted.

14. GREENFIELD MINE, (50½ miles above Pittsburgh.)

This mine, originally opened by Young, Moore & Co. (who run the coal over a tipple at the river), was operated during 1864 by L. W. Morgan, who purchased a half interest in the property in the spring of 1865 and continued to operate until it became the property of Morgan, Craft & Lambert ; succeeded by Morgan and Lambert, until Lambert sold his interest to Morgan ; and Morgan in the spring of 1873, sold the whole to Jordon S. Neel, who continues to own and operate.

The coal of the front hill is nearly exhausted, together with about 125 acres beyond the North fork of Pike run which is distant 1000 yards from the river at that point.

Coal at pit mouth 42 feet above low water.

Employ at present 30 miners, and run 3000 bushels of lump coal per day.

Ventilated by furnace and shaft.

15. REED MINE, (50½ miles from Pittsburgh.)

When this mine was opened up by Thomas Thomas under lease from James Ales about fifty years ago the coal was transported from the mine to the boats at the river by hand-barrows.

The mine has been owned and operated successively by Shafer, Jesse Reed and (now) by W. W. Patrick.

Latterly the coal was mined in the usual manner and run over a tipple at the river ; but the tipple has been removed and no coal run since 1867. About 50 acres of coal have been mined out.

16. GLOBE MINE, (49½ miles from Pittsburgh.)

Opened in 1872 by Leadbetter & Co., who operated under lease from Robert Gregg until 1879, when the property was sold to the present owners, Crowthers, Musgrave & Co. They have not run any coal during the present summer.

This mine produces 66 per cent of lump, 22 per cent nut, and 12 per cent dust coal.

Seventy-five acres have been mined out.

Bottom of coal at pit mouth 74 feet above low water.

The mining conducted on the double-entry system ; ventilated by a furnace and shaft, located 600 yards from the river front, 33 feet deep, with a stack 30 feet high.

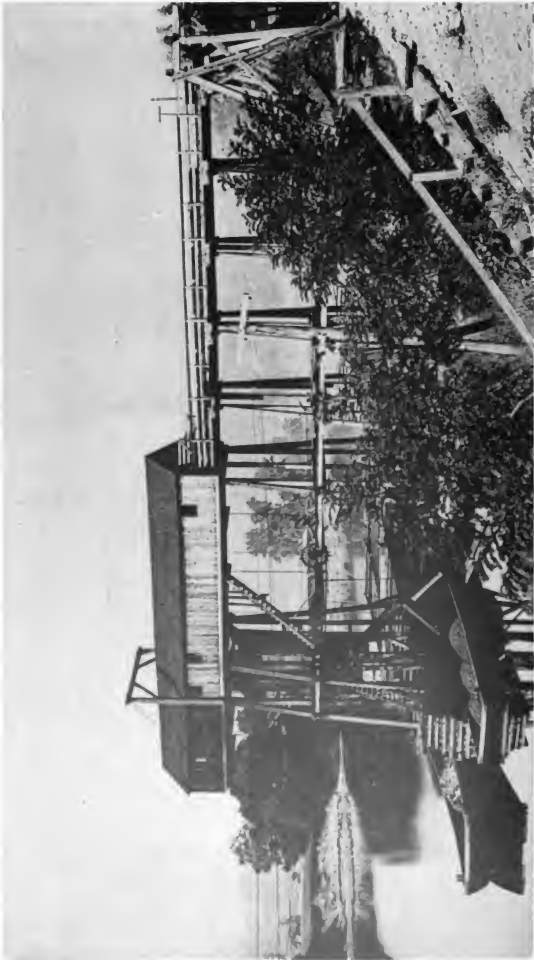
17. DEXTER MINE, (49½ miles from Pittsburgh.)

Was opened in 1872 by Furlong & Co., who operated under lease from Robert Gregg the owner until 1879, when it was purchased by Crowthers, Musgrave & Co., the present owners. This mine is operated in connection with the *Globe* mine and the coal transported through the main entry and over the tipple of that mine. The tipple of this mine is taken away, but they are arranging to build a new one at an early day.

The *butt entries*, driven in a north-west direction *in both mines*, rise 36 feet in 650 yards, and the face entries driven in a northerly direction also rise.

18. ECLIPSE MINE, (49½ miles above Pittsburgh.)

Was originally owned and opened by Smith and Leadbetter, since when it has been successively operated by Lewis Smith, Smith & Co., Moore and Moore, and Jordon S. Neel the present operator, who leased it from the owner, J. H. Eakin, in 1880. The coal of the old mine was exhausted some years ago. Neel opened up an adjoining tract of 125 acres which is now being run out through the main entry of the old mine. It is a drift mine and the coal is run out level over the railroad from pit mouth, and down a short incline, to the tipple at the river.



1871

CALEDONIA TIPPLE.

REUBEN HARTING CO.

Tipple floor 34 feet above low water.

Bottom of coal at pit mouth 52 feet above low water.

The coal rises slightly up and back from the river.

The daily output amounts to 10,000 bushels per day of lump coal which is shipped by water. The percentage of lump coal run is 67 to 33 of nut and dust.

100 miners, 5 drivers, 4 trappers and 9 outside men.

19. CALEDONIA MINE, (49½ miles from Pittsburgh.)

Was opened up by Robert Toban and A. Kennedy about thirty-five years ago and has been successively operated by Jobs, Black & Co., Cyrus Miller, Grubbs and Montgomery, Joseph Short & Co., Grey and Mann, and Richard Wellington.

It is now owned by Samuel Thompson, and operated under lease by Thomas J. Woods & Co. since November 1st, 1881.

About 40 acres of the coal were mined out up to the time when Woods leased the property. Woods built a new tipple and ice-breakers in 1882. He run 500,000 bushels that year.

The mine is worked on the double-entry system, all butt entries are driven to the left of main entry and are rising moderately to the head. The rooms are driven 26 feet wide, and ribs between rooms are left 10 feet wide.

The breast and both bottom coal members are mined out, amounting to 7½ feet in height. Roof coal is ten inches, and the *over-clay* ten inches in thickness. The roof coal is left undisturbed.

The present output is 9000 bushels per day of lump coal.

The screenings give 66 per cent lump, 17 per cent nut and 17 per cent dust coal.

Ventilation is produced by a furnace and shaft. The shaft is circular in form, seven feet in diameter, 89 feet from coal to surface, with 35 feet of a wooden stack added on top.

Bottom of coal at pit mouth 55 feet above low water.

They employ 100 miners, 6 drivers, 2 trappers and 7 day-men and the coal is shipped by water.

Woods built a new tippie, ice-breakers and furnace since he leased the property and everything about the mines is now in good working condition.

No clay-seams or soot-veins have been noticed.

Rolls in the floor of the mine are numerous, and some of them reach a height of two feet, cutting out the bottom coal without otherwise disturbing the seam.

Cleavage in entry No. 3 bears N. $63\frac{1}{2}^{\circ}$ W. 8 feet.

“ “ “ “ 4 “ N. $65\frac{3}{4}^{\circ}$ W. 6 “

“ “ “ “ “ “ N. $66\frac{1}{4}^{\circ}$ W. 4 “

20. CHAMPION MINE, (49 miles from Pittsburgh.)

Opened up by Johnson Moore in about 1843; subsequently refitted and put in better working condition by Ezeriah Crow; bought by Samuel Thompson in 1879, who built the present tippie and leased it during that year to L. W. Morgan and John Dixon the present operators.

The main entry is driven 500 yards through the first hill and as much more into the second hill, it rises to the head.

Mine worked on the double entry system, and 50 feet of a pillar left between the butt entries. About six inches of the bottom coal is left undisturbed.

Rolls in the bottom or floor are frequent but none are found in the roof.

Clay seams are rare and only two have been noticed in the mine. One of these only amounts to a *spar* and bears N. 82° E. for a distance of 400 yards. It displaces the *over clay* and roof coal six inches, but only extends downward through the coal to the bands or bearing in member. The coal is only fractured and colored with a small portion of the over clay that has been carried into the opening. I made the following section in the main entry:

	Shale.	
Champion Mine Section. (Fig. 7.)	{	Coal, 0' 2"
		Clay parting, 0' 4"
		Coal, 0' 8"
		Carbonaceous shale, 2' 2"
		Roof coal, 0' 9"
		Over-clay, 1' 0"
		Breast coal, 4' 9"
		Parting, 0 ½"
		Bearing in coal, 0' 2"
		Parting, 0' ½"
		Brick coal, 1' 4"
		Parting, 0' ½"
Bottom coal, 1' 6"		

making altogether 7 feet 9 inches of coal *under the over clay*.

The roof division is variable in this mine for within 50 yards of the above place. In the same entry I found it thus :

	Shale.	
(Fig. 8.)	{	Coal, 0' 5"
		Parting, 0' 1"
		Coal, 0' 4"
		Parting, 0' 3"
		Coal, 0' 6"
		Carbonaceous shale, 2' 0"
		Roof coal, 0' 9"

Clearage planes bear N. $64\frac{1}{2}^{\circ}$ W. 4 feet.

“ “ “ N. $66\frac{3}{4}^{\circ}$ W. 6 feet.

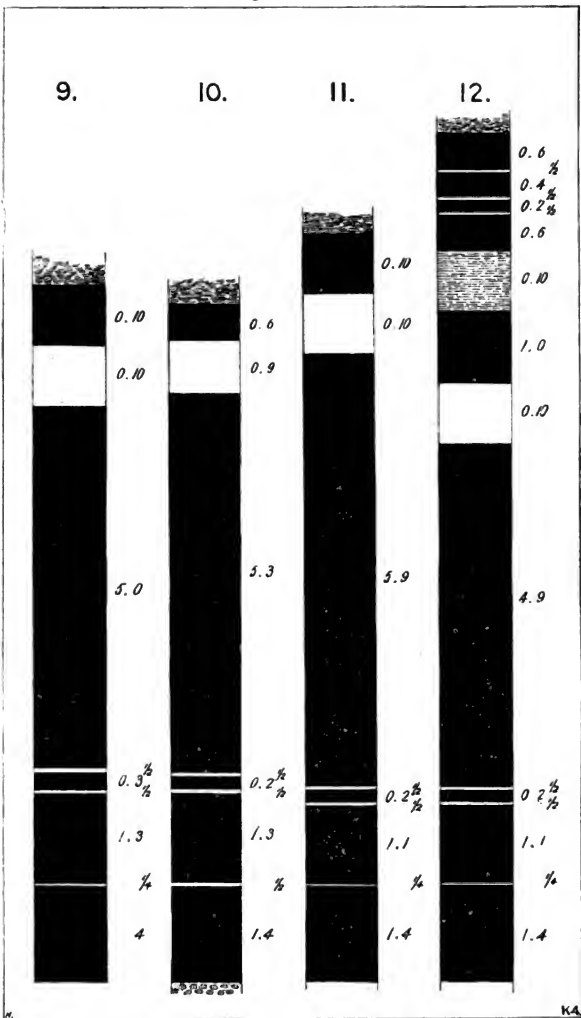
Ventilation is produced by a furnace with a square stack built of stone and brick, 60 feet in height and 5 feet in the clear on the inside.

The rooms are provided with two rows of wooden posts set upright eight feet apart while the coal is being mined out.

They employ 75 miners, 5 drivers, 1 trapper, 1 road-man and 5 outside men, and the output averages 8000 bushels of lump coal per day.

21. WOODS RUN MINE, (48½ miles from Pittsburgh.)

Opened by T. J. Woods and J. B. Williams in coal belonging to Joseph Woods in 1862. This coal was mined out, and they bought a tract of coal adjoining the other in



the rear from Hugh McKee, which they operated until 1880, when they sold to Samuel Thompson, the present owner. Since May, 1882, it has been operated under lease by W. H. Gregg.

The coal is shipped by water.

50 acres have been mined out altogether.

Operated on the double entry, system with air-course running parallel to and 60 feet from the main entry, which crosses a *swamp* nine feet at 600 yards distant from the second pit mouth. This *swamp* enters the mine near the forks of the run, passes through it in a north-west direction and enters the head workings of the Champion mine. I find the section here as follows :

	Shale.		
<i>Woods Run Mine</i> <i>Section.</i> <i>(Fig. 9.)</i>	{	Coal,	0' 10"
		Over-clay,	0 10
		Breast coal,	5 0
		Parting,	0 $\frac{1}{2}$
		Bearing in coal,	0 3
		Parting,	0 $\frac{1}{2}$
		Brick coal,	1 3
		Parting,	0 $\frac{1}{2}$
	{	Bottom coal,	1 4

They mine out both bottom and breast coal members.

Cleavage seams bear N. 65° W. 4 feet.

“ “ “ N. 68 $\frac{1}{2}$ ° W. 3 “

“ “ “ N. 66 $\frac{3}{4}$ ° W. 6 “

Ventilated by furnace and stack. Air-current near inlet measures 7000 cubic feet and at the furnace 7425 cubic feet passing per minute.

They employ 65 miners, 4 drivers, 2 trappers, pit boss and 3 outside men on tipple and 2 on the boats. Present output averages 6000 bushels of lump coal per day.

22. AMERICAN MINE, (48 $\frac{1}{2}$ miles from Pittsburgh.)

Opened by Kelsey and Feals in 1855 ; succeeded by William Latta who sold to F. H. Coursin the present owner and operator.

It is worked on the double entry system. Butt entries

are driven N. $72\frac{1}{2}^{\circ}$ W. and the main entry N. $13\frac{1}{2}$ E. 900 yards to the head.

Ventilated by furnace and shaft. Volume of air-current passing out at furnace measures 7500 cubic feet per minute.

Cleavage seams or faces bear N. $68\frac{1}{2}^{\circ}$ W. 6 feet.

“ “ “ “ N. $68\frac{1}{4}^{\circ}$ W. 6 “

The coal is shipped by water and the output amounts to 5500 bushels of lump coal per day. 49 miners, 4 drivers, 1 trapper and 4 outside men are employed.

23. PEACOCK MINE, (48 miles from Pittsburgh.)*

Owned by Jonas Crowthers and opened up by him in 1882.

Operated on the double entry system. Main entry and air-course are driven square against the cleavage or faces 160 yards to their head, with 25 feet of solid coal between them. The coal rises slightly toward the head of main entry and air-course.

Coal at pit mouth 52 feet above low-water and 22 feet above railroad.

One butt entry has been driven from main entry on the left to the line, but no coal has yet been shipped to market. He is arranging to ship by both river and rail.

Property contains 100 acres of coal.

24. SNOW HILL MINE, (47½ miles from Pittsburgh.)

Owned by the heirs of William Forsythe, deceased.

It was opened up about 1832 to supply a local domestic trade. It was operated as a cart pit and some coal was shipped by river. It was leased in 1881 for a term of twelve years by the Alps Coal Company composed of Joseph Underwood, Joseph S. Elliot, L. S. Miller, J. W. Ales and M. E. Lynn, who built the present tippie and made other necessary improvements.

*46½ miles by rail.



84570N

SNOW HILL TIPPLE.

GEORGE BENTON CO.

It is worked partly on the block and partly on the double-entry system. The main entry is driven against the faces or cleavage and crosses two *swamps*.

The first swamp is 13 feet deep and the bottom is reached at 150 yards from the pit mouth. From the bottom of this swamp the entry rises 8 feet in 200 yards, then dips 10 feet in 200 yards and runs level for 40 yards more to its head. That part of the main entry crossing the first swamp has been leveled by blasting the roof down. at an expense of \$500.

I obtained the following section here :

	Coal and partings,	1' 0"	
	Shale and slate,	10 0	
Snow Hill Mine Section. (Fig. 10.)	{	Roof coal,	0 6"
		Over-clay,	0 9
		Breast coal,	5 3
		Parting,	$\frac{1}{2}$
		Bearing-in coal,	2
		Parting,	$\frac{1}{2}$
		Brick coal,	1 3
		Parting,	0 $\frac{1}{2}$ "
	{ Bottom coal,	1 4	
	Clay bottom containing limestone nodules.		

Twenty-five acres have been mined out.

Coal at pit mouth 37 feet above low water.

They are arranging to build a furnace. The shaft is completed, 63 feet in depth, circular and 8 feet in diameter and costs \$6 00 per foot for the sinking.

Cleavage planes in the coal : N. $66\frac{1}{2}$ W. 4 feet.

N. $68\frac{1}{2}$ W. 2 "

N. $66\frac{1}{2}$ W. 3 "

N. 67 W. 3 "

The output amounts to 5600 bushels of lump coal per day at present ; 60 miners, 4 drivers, one trapper and 4 outside men employed.

Reported percentage of product : 75 per cent lump, 9 per cent nut and 16 per cent dust coal.

25. BARGEDDE MINE, (47½ miles from Pittsburgh.)

Opened up by William Forsythe in 1863 and operated by him as a barrow or cart mine for several years; coal wheeled to the river and loaded into boats without a tipple.

In 1879 James Harris & Co. leased the mine for a term of ten years, built a tipple and are the present operators.

It is worked on the double-entry system and 25 acres have been mined out.

They are now running over 4000 bushels of lump coal per day and employ 40 miners, 4 drivers, 1 trapper and 4 outside men. Ventilation by a furnace.

THE HOAF COAL LOTS.

The coal and surface fronting on the river between the *Bargedde* mine and the mouth of *Little Redstone* creek belonged to David Hoaf, who (about 1840) laid it off into ten coal lots of about thirty acres each. Pits were opened in each of these lots and operated in a small way. The coal was carted out of the mine and stacked or piled on the river bank where it remained until the water had acquired the proper stage for loading and shipping to market. One of these lots is now included in the *Stimmel* mine; one in the *Furlong* mine; three in the *Troytown* mine; three in the *Turnbull and Hall* mine; and two in the *Frazier and Frye* mine.

26. STIMMEL MINE, (46½ miles from Pittsburgh.)

Opened in 1863 by Henry Stimmel and operated as a barrow mine until 1868, when it was leased to Richard Wellington, who built a tipple, made other improvements and operated the mine until 1873, when he and Wm. Troy leased it for a term of five years more and operated until the tipple was carried away by high water in 1877. Since that time no coal has been run from the mine.

Total area mined out, twelve acres.

27. FURLONG MINE, (46½ miles from Pittsburgh.)

Located between the *Stimmel* and *Troytown* mines ; this Furlong mine was opened up by John Furlong in 1832. It was operated for some years as a cart pit by E. C. Furlong who subsequently built a tippie and operated until 1871 when the coal became exhausted and the works were abandoned.

Area mined out, thirty acres.

28. TROYTOWN MINE, (46½ miles from Pittsburgh.)

Opened by Andrew Park in 1844 and operated by him until 1852 when it was sold to Job Kitts. It was again sold to J. F. & W. R. Troy in 1860 and run by them until 1875 when it was purchased by Adam Jacobs the present owner.

Three of the original Hoaf lots are comprised in this property.

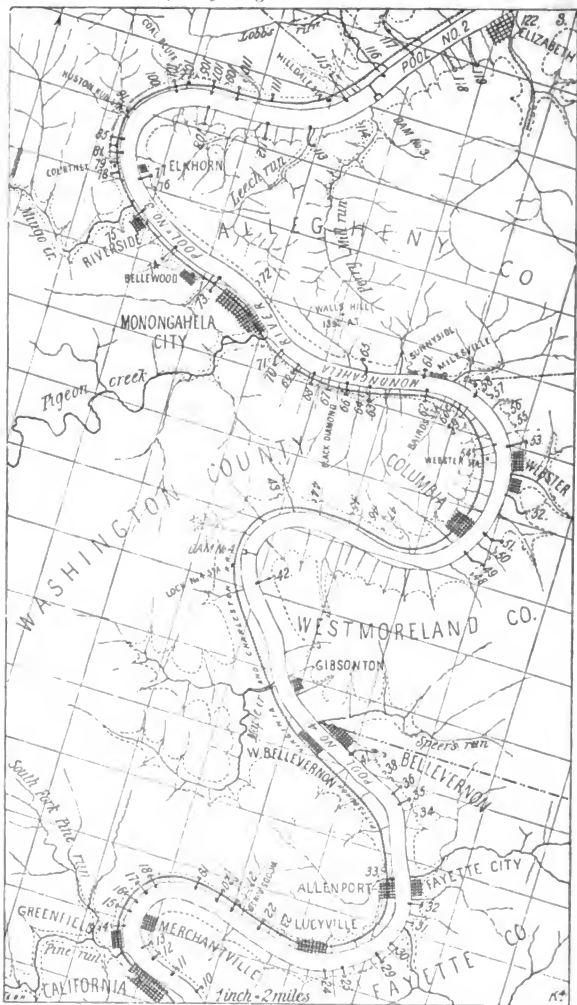
The mine is now operated under lease by Edward Furlong and is producing 3000 bushels of lump coal per day.

The main entry is driven S. 38° E. 800 yards to the head and crosses a *swamp* that is also found in the Turnbull and Hall mine.

Ventilation by a furnace and shaft.

25 miners, 2 drivers and two outside men employed.

Sixty acres have been mined out.



29. TURNBULL & HALL MINES, (46½ miles from Pittsburgh.)

Opened up by Wm. Jackman and Jonah Wilkens in 1848 and operated by them until 1870 when it was sold to Joseph Turnbull and John Hall, the present owners and operators.

It includes three of the original "Hoaf" coal lots in connection with other coal lands in the rear and also includes what was once known as the *Crow pit* (a short distance below the present tippie) which was purchased by the present owners from Briggs & Co. in 1880.

The *Crow pit* tippie was built by James Rutherford; and Turnbull and Hall continued to operate it until last February when a rise in the river carried the tippie away.

The two mines are now consolidated and the coal from both run over the upper tippie.

It is now worked mainly on the double entry system. Main entry and air courses are driven against the butts and parallel with the cleavage. These entries pass under Little Redstone Creek at 850 yards from the pit mouth, and are driven 350 yards beyond the creek.

The mine was ventilated for some time by means of a furnace and shaft located on the air course at the river front; but since the workings have reached the creek where the covering is light they obtain sufficient air current by means of a shaft and a slope at the last named place without the use of the furnace.

The coal seam rises along the main entry four feet in 300 yards; dips 9 feet for 300 yards to bottom of first *swamp*; then rises 3 feet in 200 yards and dips 4 feet in the next 200 yards to head and bottom of the second *swamp*.

I observed one *clay seam* bearing N. 84° E.; and one *soot vein* crossing the main entry near where it passes under the creek.

The coal is only 18 feet under the creek bed at this place and a considerable quantity of water flows into the entry through the *soot vein*, which crosses the entry on a bearing of N. 20° E.

3 K'.

Total area mined out, fifty acres.

Bottom of seam at pit mouth, 35 feet above low water.

Cleavage planes: N. $67\frac{1}{4}^{\circ}$ W. 8 feet; N. $65\frac{1}{4}^{\circ}$ W. 6 feet; N. $72\frac{1}{2}^{\circ}$ W. 8 feet; N. $67\frac{1}{2}^{\circ}$ W. 4 feet, and N. $67\frac{1}{4}^{\circ}$ W. 3 feet.

Cleavage in the *block* slate bears: N. $48\frac{1}{4}^{\circ}$ W. 10 feet; N. 45° W. 10 feet; N. $50\frac{1}{2}^{\circ}$ W. 20 feet; N. 47° W. 30 feet, and N. 44° W. 30 feet.

I observed the following section at this mine:

Carbonaceous shale.		
Turnbull & Hall mine Section. (Fig. 11.)	Coal,	0' 3"
	Slate,	0 4
	Coal,	0 5
	Parting,	0 $\frac{1}{2}$
	Coal,	0 1 $\frac{1}{2}$
	Parting,	0 $\frac{1}{2}$
	Coal,	0 1 $\frac{1}{2}$
	Parting,	0 $\frac{1}{2}$
	Coal,	0 1 $\frac{1}{2}$
	Clay shale,	0 3
	Coal,	0 3
	Block slate,	8 3
	Roof coal,	0 10
	Over clay,	0 10
	Breast coal,	5 6 to 6'
	Parting,	0 $\frac{1}{2}$
	Bearing in coal,	0 2
	Parting,	0 $\frac{1}{2}$
	Brick coal,	1 1
	Parting,	$\frac{1}{4}$
Bottom coal,	1 4	

At another place in the mine I observed a *sandstone* from 8 inches to $2\frac{1}{2}$ feet thick between the roof coal and block slate.

The *over-clay* is quite uniform in thickness and free from horsebacks or swells.

65 miners, 4 drivers and 6 day men are employed.

Daily output amounts to 6500 bushels of lump coal beside the nut and dust. They obtain 70 per cent. of lump to 17 per cent. nut and 13 per cent. of dust coal.

30. CARONDELET MINE, (46 $\frac{1}{2}$ miles from Pittsburgh.)

Opened up by Abraham Hoaf in 1834 and operated as a barrow mine for a number of years; it was also operated

by George Winters under lease from Hoaf until it was purchased by John Kennedy and Elliot Frazier. Frye bought Kennedy's interest in 1872 and the mine is now operated by Frazier and Frye.

It is worked on the double entry system and only the coal between the bands (or bearing-in member) and the over-clay is mined out, amounting to an average of 5 feet 9 inches in height.

100 acres have been mined out of the front hill between the river and Little Redstone creek and 60 acres of that part lying beyond the creek.

The mine is ventilated by furnace-power with a shaft 28 feet in height and a stack additional 56 feet high.

Bottom of coal at pit mouth 46' 8" above low water.

Present output 6740 bushels of lump coal per day.

Screening gives 75 per cent lump and 25 per cent of nut and dust coal together.

82 miners, 5 drivers, one trapper and 5 outside men are employed.

31. LITTLE REDSTONE MINE, (46 miles from Pittsburgh.)

Owned and operated by James Rutherford who opened it up and built the tipple in 1879. He bought the property from Israel Stevens.

It is worked on the double entry system and ventilated by natural means afforded by its proximity to the outcrop along Little Redstone creek.

Tipple floor 45 feet above low water and the bottom of the coal at pit mouth has the same elevation.

Four butt entries; three of which are driven to the outcrop: the main entry has reached a distance of 300 yards from its mouth. They mine out $7\frac{1}{2}$ feet and leave one foot of coal in the bottom.

Daily output 2000 bushels; 21 miners, 2 drivers and 2 outside men being employed.

Area mined out to this time, 18 acres.

(32. CONNECTICUT MINES, (45½ miles from Pittsburgh.)

Opened in 1865 by Sherwood Sterling, member of the Connecticut Coal Company, and operated by them for three years; it was sold in 1881 to James Mehaffey & Co. who are the present owners. The mine has not been in operation since 1872 and the tipple was carried away by high water during the same year.

The coal was hauled from the pit mouth on a short outside road to the check-house, and from thence it passed down an incline tramway to the tipple at the river, where it was screened into the boats.

Main entry rises from the pit mouth for 300 yards where it strikes a *fault* and the coal seam drops about *six feet*. After which the main entry dips to its head at the rate of three inches per rod. The entries were all driven single.

Area mined out, fifteen acres.

33. CLIPPER MINE, (45½ miles from Pittsburgh.)

Owned and opened up by Capt. Samuel Clark in 1862, who operated it until 1876, when it was leased to Clark Hughes and George Maxwell, who operated it for three years. It was again leased to E. C. Furlong, who operated for two years. It was then bought by the Clipper Coal Company and operated by them to the present time.

The old tipple was removed and a new check-house, tramway and tipple built at the upper pit mouth and at the river.

Mine worked at present on the double entry system; head of the workings 800 yards from the pit mouth.

Bottom of coal 91 feet above low water at the new pit mouth and 96 feet above low water at the old pit mouth; the distance between the two pit mouths being 700 feet.

Main entry at 600 yards from the front crosses a *swamp* that bears N. 20° W, and is 220 yards wide and eleven feet deep in the center.

I observed a *spar* in the old main entry that bears N. 31½ E. for a distance of 500 yards. It commences at the

surface or front of the hill a short distance below the old pit mouth, and is cut by the old main entry for a considerable distance until No. 6 butt entry is reached, where it connects with a *clay seam* that bears about S. 40° E. so far as it has yet been developed. At the clay vein the roof coal is *displaced vertically* about 6 inches.

Cleavage plains bear: S. 65 E. 9 feet; S. 66½ E. 9 feet; S. 66½ E. 8 feet; S. 68 E. 12 feet; S. 64½ E. 6 feet; S. 65½ E. 6 feet, and S. 65½ E. 8 feet.

The section was found to be as follows:

	Carbonaceous shale.	
<i>Clipper mine Section. (Fig. 12.)</i>	{	Coal, 0' 6"
		Parting, ½
		Coal, 4
		Parting, ½
		Coal, 2
		Parting, ½
		Coal, 6
		Slate, 10
		Roof coal, 1 0
		Over-clay, 10
		Breast coal, 4 9
		Parting, ½
		Bearing-in coal, 2
		Parting, ½
		Brick coal, 1 1
Parting, ½		
Bottom coal, 1 4		

Ventilation is produced by a furnace and stack. The furnace is arched and lined with fire-brick. It is 20 feet long, 5½ feet wide and 5' 8" high in the clear. The fire bed is four feet in length. The stack connects with the rear end of the furnace, is 60 feet high, built of stone and brick, square in form and six feet in the clear.

30 miners, 4 drivers and four day men are employed.

Output amounts to 4500 bushels daily.

Area mined out, 60 acres.

31. ASHMAID MINE. (4½ miles from Pittsburgh.)

Opened up at an early day and operated by Johnson Dinsmore for some years.

The coal was run from the pit mouth down to the river on



an incline slide and loadened into *broad-horn boats*. These boats were made square at both ends, 100 feet long, 25 feet wide, and from three to four feet in depth, and would hold from 6000 to 8000 bushels.

The property was bought from Joseph McKee by T. J. and Wesley Larmer in 1865. They ran coal during a portion of that year and Wesley sold his interest to his brother T. J. Larmer who is the present owner. No coal has been run here since 1865.

35. NEW TREMONT MINES, (44½ Miles from Pittsburgh.)

Capt. Samuel Clark & Co. opened this mine and built the tippie in 1853. They also built the tow boat *Clipper* the same year and continued to operate the mine until Capt. Clark died February 14, 1879.

John A. Woods & Sons bought the property in 1881 and are the present operators.

The coal is screened at the check house into a tram wagon and run down a short incline tramway to a sliding tippie at the river and dumped into boats.

An area of forty acres has been exhausted.

36. OLD TREMONT MINES, (44½ Miles from Pittsburgh)

Opened up by W. H. and Samuel Clark in 1847, who operated the mine on a small scale and only supplied the Packet boats with coal until 1849, when they built the tow boat *Tempest* and were the first to transport coal to market from this Pool by towing.

Twenty-five acres were mined out up to 1854 and the mine has not been operated since.

The property now belongs to the estate of George Clark, deceased.

37. LITTLE PITTSBURGH MINE, (44½ Miles from Pittsburgh.)

Belongs to the estate of George Clark and was opened up by John A. Bevan for R. E. Schmertz & Co in 1879.

Schmertz & Co. operate it under lease and use the lump coal in their Glass Factory at Bellevernon.

They have nine (9) ovens and *coke the dust coal* produced, a portion of which is also used at the same factory. The other portion is used at Gibson's Distillery in Gibsonton.

Daily output 1200 bushels during the time when the factory is running.

They are mining that part of the coal which remains in the Old Tremont mine and have taken out about 900,000 bushels. I find the section to be

	Sandstone massive.		
	Shale,	4' 0"	
Little Pittsburgh mine Section. (Fig. 13.)	{	Coal,	1 0
		Slate parting,	0 6
		Coal,	0 6
		Sandy shale and block slate,	12 0
		Roof coal,	0 2
		Over-clay,	0 10
		Breast coal,	4 1
		Parting,	0 $\frac{1}{2}$
		Bearing-in coal,	0 2
		Parting,	0 $\frac{1}{2}$
		Brick coal,	1 0
		Parting,	0 $\frac{1}{2}$
		Bottom coal,	0 10
	Clay bottom, containing limestone nodules.		

I find a *spar* in the roof crossing through the mine on a bearing of N. $58\frac{1}{2}^{\circ}$ E. for a distance of 100 yards, which also follows (near) the center line of a belt 100 yards in width, passing through the workings in which the *over-clay* was found to be *entirely absent*. Within this belt the roof coal rests immediately on the top of the main breast and on its margin the *over-clay* appears *with a feather edge* and gradually assumes its usual thickness in a distance of 20 yards from the edge of the belt.

Cleavage planes bear N. $64\frac{1}{2}$ W. 5 feet.

N. $66\frac{1}{4}$ W. 5 "

Cleavage in the block slate bears N. $46\frac{1}{2}$ W.

Bottom of the seam here is 100 feet above low water.

38. TAGGART MINE, (41 miles from Pittsburgh.)

Is reported to be the *oldest pit* in this vicinity. It was opened up by Abraham Booher to supply a local trade and is owned at present by the heirs of Thomas Taggart, deceased. Four acres of coal have been mined and the pit is now abandoned.

39. GLASS-WORKS MINE No. 1, (43½ miles from Pittsburgh.)

Opened by William Everhart in 1850 for the use of the Bellevernon glass-works. Fifteen acres have been mined out and the pit is abandoned.

40. GLASS-WORKS MINE No. 2, (43½ miles from Pittsburgh.)

Opened by John A. Bevan in 1874 for R. E. Schmetz & Co. and the product of the mine used in their glass-works at Bellevernon. Six acres have been mined out and the works have not been in operation since 1880.

41. SPEER'S MINE, (43½ miles from Pittsburgh.)

Situated at the upper end of Bellevernon; this mine was put in operation by L. M. and W. F. Speers in 1869, who continued to run the mine until 1877. The coal was run from the mine on a short outside road and through a check-house down an incline tramway to the tippie at the river. Thirty acres have been mined out and the property now belongs to John Carrothers. No coal has been mined since 1877.

42. ROSTRAVER MINE, (40½ miles from Pittsburgh.)

Opened up by Bartman & Todd in 1845 who ran the coal down an incline road to the river in a manner somewhat similar to that employed there at the present time.

Several new tipples have been built from time to time since then, and the present one was built in 1877. The coal is run down an incline road, 218 yards in length, from the check-house near the pit mouth to the tipple at the river, where it is screened into the boats.

Subsequently the property was purchased by Capt. Adam Jacobs and operated by Loomis and Watson, until it was sold to Major Thomas McGowan and Robert Connell in 1862, who operated the mine until it was again sold in 1873 to John W. Clark the present owner and operator.

Clark also at the same time purchased an adjoining tract of 152 acres of coal from Thomas Reeves and Daniel Castner.

The original tract of 60 acres is all mined out together with 20 acres additional out of the Reeves and Castner tract.

It is worked on the double-entry system. The main entry is driven nearly perpendicular to the coal faces and reaches the rear outcrop at a distance of 860 yards from the main entrance to the mine. This entry dips slightly from the front.

The butt entries are driven in pairs with a rib or pillar of 30 feet of coal remaining between them. The distance between each pair is 160 yards, which makes the rooms when driven 80 yards in length including the turn-outs.

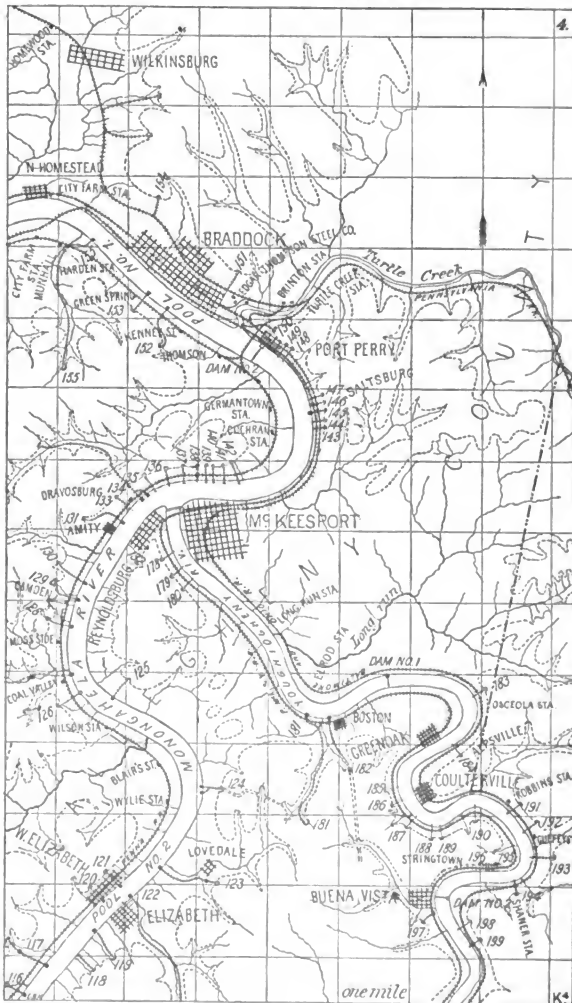
The new main entry is turned off from the old main entry at 140 yards from the pit mouth, and is driven on the butts to a distance of 1400 yards. This entry rises 11 feet in that distance to its head which indicates that *the axis of the anticlinal* is still some distance farther up the river.

Bottom of coal at pit mouth 230 feet above low water.

Mine ventilated by a furnace and a circular shaft six feet in diameter (cut through 70 feet of rock) on top of which is placed a wooden stack 12 feet in height.

The works have not been in operation since last May.

I found the roof coal very much disturbed by *horse-backs* or *swells in the over-clay*, and in the intervals between them *this clay is often entirely absent*. These horse-backs take the place of a large portion of the roof coal members, and sometimes cut out a small portion of the upper part of the main breast member.



CHAPTER V.

Coal Mines Located in Pool No. 3.

43. WOLF HARBOR MINE, (39½ miles from Pittsburgh.)

Fronting on the river near the south bank of Wolf Harbor run this mine was opened in 1830 by Wilson and McFarland and operated by them for several years in a primitive manner but has not been in operation for over forty years. It is now owned by W. J. Alexander & Co.

44. WHITESVILLE MINE, (39¼ miles from Pittsburgh.)

Opened up by J. Addison Stockton in 1850 for Townsend, Hayes and Stockton who owned the property and operated the mine until 1853 when it was sold to Capt. David White.

It continued to be operated under the management of Murray White until 1856 since when no coal in any considerable quantities has been run from the mine.

The property was bought by the present owners General Richard Coulter and Gustavus Stoy.

Bottom of coal at pit mouth 153 feet above low water.

Coal, reported to be of excellent quality and yielding a coke well adapted to furnace use on account of its great resistance to crushing power. Analyses made by Henry G. De Brunner, Professor of Chemistry at the Pittsburgh College of Pharmacy, show the coal and coke to contain :

Coal.	Coke.
Moisture, 1.4298%	Moisture, 0.4675%
Volatile matter, 32.0305	Fixed carbon, 91.3550
Fixed carbon, 64.9191	Sulphur,5225
Sulphur,7090	Ash, 8.1775
Ash, 1.6206	

(45 K⁴.)

45. BOYLE MINE, (38½ miles from Pittsburgh.)

Opened on the Boyle property near the lower line of the Whitesville property about 1838 by Benjamin Behanna, Henry Behanna and James Jennings, and operated by them in a small way as a river mine for one year. The coal was run from the pit mouth to the river down an incline shute. Bottom of coal here 134 feet above low water.

46. MYERS MINE, (38½ miles from Pittsburgh.)

Located a short distance below the Boyle mine. This mine was owned and opened up by Henry, Casper and John Myers in 1838, who operated it only for a short time, one acre being mined out. The coal was run from the pit mouth down an incline shute to the base of the hill, from where it was transported in wheelbarrows to the boats at the river.

47. JACKSONVILLE MINE, (38½ miles from Pittsburgh.)

Located below the Myers mine this mine was opened up in 1863 by Samuel Davis. The coal was run out of the mine into a coal-yard at the pit mouth, where it was deposited until enough was mined to fill a boat holding about 3000 bushels; and then in tram-wagons down an incline road to the boats at the river. About one acre has been mined out. Not been in operation for over forty years. Now owned by the Hon. James K. Moorhead, of Pittsburgh.

48. WELSH MINE, (37½ miles from Pittsburgh.)

Located about 200 yards above the Iron City mine, this mine was opened up by Robert Roberts & Co. in 1850.

They were succeeded by Miller and Williams, who operated until 1866, since which time it has remained idle. It was operated as a cart mine and the coal was run from the check near the pit mouth down an incline tramway to the river. Area mined out, 25 acres.

49. IRON CITY MINE, (37 miles from Pittsburgh.)

William Brown purchased 226 acres of coal and river frontage at this place in 1863, opened the mine, built the necessary improvements and operated until 1864, when he sold to Joseph Keeling & Co. who ran the mine for some time and sold to Phillips and Mitenzwyre the present owners and operators.

It is worked on the block system, with the main entry and air course driven parallel against the butts, 24 feet apart, from the furnace near the front to near the head of the workings, a distance of 925 yards.

Face entries are driven to right and left of the main entry, at intervals of 150 yards, from which the working butt entries are driven at intervals of 160 yards.

Main entry dips 60 feet in 1210 yards from inlet to pumping shaft, 130 feet deep.

The ventilation is produced by a furnace with a shaft through 63 feet of rock and a 16-foot stack on top of the shaft.

The air shaft is circular in form and six feet in diameter.

The furnace is 31 feet long (and arched), 7 feet in width, 2½ feet from floor to grate bars and 5½ feet from bars to top of arch. This furnace with a moderate fire produces an air current of 19,220 cubic feet per minute.

The coal is hauled from the pit mouth on an outside road for a distance of about 100 yards to the check-house, and from there the cars run down an incline road to the tippie at the river.

Tippie floor 38 feet above low water.

Bottom of coal at pit mouth 210 feet above low water.

Horse-backs or *swells* in the over-clay are very large and

numerous and disturb the roof coal members to a marked degree. They are also usually found occupying the place of a small portion of the top of the main breast coal. I noticed *no rolls in the bottom*. The disturbance appears to be confined to the roof members and gives that portion of the seam a very confused and broken appearance.

Clay seams are frequent and are found crossing the mine and each other in many different directions. They all extend downward from the roof, some of them terminating at the bands, while others pass into the floor of the mine. They are usually accompanied with some *displacement* of the coal in a vertical direction.

Along the main entry I observed, in a distance of 550 yards, seventeen *horse-backs* measuring from ten to forty feet in length and from one to three feet in thickness, the intervals between them usually void of over-clay.

Their general direction is N. 70° E.

There are two small *swamps* on the right of the main entry both bearing about S. 70° E.

Cleavage planes run N. 68° W. 7 feet; N. 68½ W. 8 feet; N. 68¼ W. 6 feet; N. 67¼ W. 11 feet; N. 68 W. 10 feet; N. 66 W. 10 feet; N. 67½ W. 6 feet.

A vertical section of the coal members gives :

	Rock.	
<i>Iron City mine</i> <i>Section.</i> (Fig. 14.)	{	Coal, 0' 10" Slate, 3 Coal, 3 Clay, 6 Coal, 4 Slate, 1 Coal, 4 Slate, ½ Coal, 1 2 Over-clay from 0 to 3 feet in horse-backs. Breast coal, 4 0 Parting, ½ Bearing-in coal, 3 Parting, ½ Brick coal, 1 2 Parting, ½ Bottom coal, 1 3
		Calcareous nodules and clay.

60 miners, 5 drivers and 6 outside day men are employed ; producing 4000 bushels of lump coal per day. The whole output of the mine after screening is reported at 66 per cent for lump and 24 per cent for nut and dust coal together.

50. THOMAS MINE, (36½ miles from Pittsburgh.)

Owned and opened up by Benjamin Thomas about 1835.

James Alexander operated it under lease in 1840, operating in a small way.

Alexander Crumbly bought it from the heirs of Benjamin Thomas in 1863, operated until 1866 and sold it to Thomas Fox and Joseph Lawson.

Operated two years and sold to Jones and Watkins.

An area of four acres was mined out and the property is now included in the *Columbia* Mine.

51. COLUMBIA MINE, (36½ miles from Pittsburgh.)

Opened in 1862 by S. Crumbly and operated by him until it was sold to Fox and Lawson ; who again sold it to William and Willis Hodgson in 1869 ; who operated it until 1875, when William Hodgson purchased the interest of his brother, Willis Hodgson, deceased.

Linch and Robinson leased the mine in 1876 and continued to operate until sold to Jones and Watkins in 1879.

Jones and Watkins operated the mine until Nov. 1, 1882, when Watkins sold his interest to J. F. Jones, the present owner and operator.

The mine is worked on the block system, and the present workings are reached at 900 yards from the pit mouth.

The main entry is driven against the butts.

The furnace, located on a face entry, driven from the main entry at a point 135 yards from the pit mouth, is built with a double arch, having an opening between the arches for the air to pass through from front to back. This arrangement is supposed to utilize the heat that is absorbed by the inner arch and thereby increase the power of the fur-

nace. By the aid of an anemometer I found the *volume of air* passing through and over the furnace, with a moderate fire, to be 14,025 cubic feet per minute.

Mr. Jones informs me that the mine produces 80,000 bushels of lump coal per acre. He also says that this is 74 per cent of the whole output. The nut and dust are run together and amount to 26 per cent of the whole.

The *roof coal* members are greatly disturbed by *horse-backs* or *swells in the over-clay*. The intervals between the horse-backs are usually void of over-clay.

Numerous *clay veins* are also found traversing the mine in various directions, ranging from six inches to three feet in thickness.

The following section represents the structure:

Carbonaceous shale.		
Columbia mine Section. (Fig. 15.)	Coal,	0' 3"
	Slate,	0 2
	Coal,	4
	Slate,	$\frac{1}{2}$
	Coal,	1
	Slate,	$\frac{1}{2}$
	Coal,	2
	Slate,	$\frac{1}{2}$
	Coal,	1 $\frac{1}{2}$
	Clay,	6
	Coal,	8
	Slate,	1
	Coal,	1 3
	Over-clay,	6
	Breast coal,	3 8
	Parting,	$\frac{1}{2}$
	Bearing-in coal,	3
Parting,	$\frac{1}{2}$	
Brick coal,	1 2	
Parting,	$\frac{1}{2}$	
Bottom coal,	1 3	

The *overly shales* and rock are quite variable in thickness and composition. The *carbonaceous shale* is quite thin and in some parts of the mine its place is occupied by a clay shale ten inches in thickness. In one place I found the following section:

Section of Roof.	Micaceous sandstone.	
	Block slate,	6" to 1' 6"
	Clay shale,	0 10
	Top of upper coal member.	

Cleavage planes run N. 59 W. 3 feet ; N. 63 W. 4 feet ; N. 72½ W. 10 feet ; N. 66 W. 5 feet ; N. 67 W. 24 feet.

A *swamp* 18 feet in depth enters near the pit mouth and passes through the mine on a bearing of S. 80° E. It dips in that direction at the rate of 15 feet in 700 yards.

Another *swamp* is found in the south-east part of the present workings whose direction is nearly perpendicular to the other one.

The floor of the mine is so much disturbed with *swamps* and *rolls* that it is quite difficult to provide for proper drainage. The water collecting in the main swamp is carried away by a *siphon pipe* 5 inches in diameter through an opening at the rear of the workings ; and the water of the other swamps is conducted into this one by drains, pumping and hauling.

The coal is hauled from the mine on a short outside road to the check house and run down an incline tramway to the tipple house at the river.

They employ 70 miners, 5 drivers and 6 outside men.

Output, 6000 bushels of lump coal per day.

Bottom of coal, 200 feet above low water.

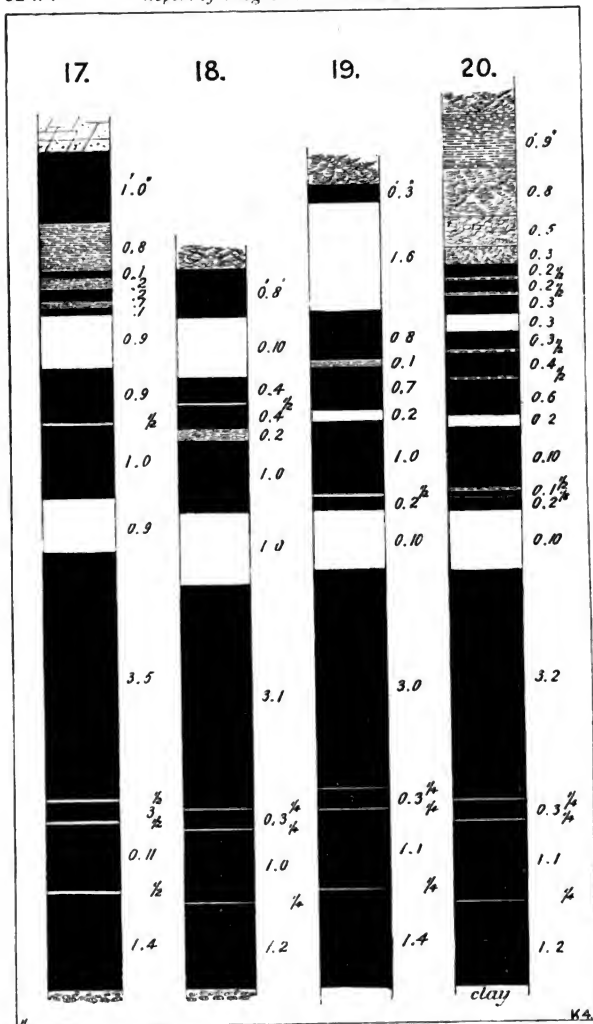
52. WEBSTER MINE, (36½ miles from Pittsburgh.)

Located at the south end of Webster and opened by James Blackamore in 1858, who operated it until 1872.

It then remained unoperated for two years and was sold to John and William Guffey in 1874, who operated it until 1880 and then leased it to Sneathon and Wilson for a term of five years.

The works are not running at the present time.

The coal is hauled from the pit mouth (when the mine is in operation) on a short outside road to the check house, where it is screened into a tram wagon having two compartments, one for receiving the lump and the other the dust coal. This wagon then runs down an incline tramway to the dust hopper, where it strikes a *knocker* that empties the dust coal, and the wagon then passes on to a sliding tipple



at the river, where the lump coal is dumped into the boats. The slack is then let out of the hopper into a wagon underneath it, which passes out on the slack road to another tippie where it is dumped into boats for its reception. A loaded wagon in passing down the tramway from the check house draws an empty wagon back up to the check house again by means of a drum and line.

This mine is worked on the block or single-entry system. The main entry is driven through the front hill, a distance of 700 yards, to a branch of Webster run, where the road crosses over on a trestle, and the entry continues on into the second hill, to the head of the present workings, a distance of 500 yards more.

The coal in the front hill is exhausted; and the total area mined out amounts to about eighty acres.

The percentage of product here when running is reported at 70 for lump and 30 for slack coal.

Horse-backs and *clay veins* are rarely found and the *over-clay* is quite *thin* and in some parts of the mine it is absent.

Bottom of seam 150 feet above low water.

The following section was obtained :

	Sandstone,	
	{ Coal,	0' 10"
	{ Slate,	0 7
	{ Coal,	4
	{ Slate,	1
	{ Coal,	3
	{ Slate,	1
	{ Coal,	2
	{ Clay,	8
	{ Coal,	9
<i>Webster Mine</i>	{ Slate,	1
<i>Section.</i>	{ Coal,	1 2
(Fig. 16.)	<i>Over-clay</i> ,	8 to 0'
	Breast coal,	3 6
	Parting,	$\frac{1}{4}$
	Bearing-in coal,	2
	Parting,	$\frac{1}{2}$
	Brick coal,	1 0
	Parting,	$\frac{1}{4}$
	{ Bottom coal,	1 3

53. GILMORE MINE, (35½ miles from Pittsburgh.)

Located in North Webster, it was opened up by Capt. Gilmore in 1871, and is now owned and operated by him.

The coal is transported from the mine to the river by appliances similar to those used at the *Webster* mine.

It is worked on the single entry system. The main entry is driven quartering to the right of the faces, and to a distance of 882 yards, through the front hill, to the outcrop in the rear of the mine. At 100 yards from the pit mouth the main entry passes into a *swamp* or *basin* 21 feet in depth; follows along the bottom of it for 200 yards; and then rises out of it. This *swamp* is circular and *dish-shaped* with no drainage outlet.

A similarly shaped *swamp* but of less depth is also found at some distance to the right of the other one.

I observed light *rolls in the roof* and six *clay veins*, but no horse-backs and *no rolls in the floor* of the mine except the swamps before mentioned.

I found the section to be as follows :

	Sandstone.	
Gilmore Mine Section. (Fig. 17.)	Coal,	1' 0"
	Slate,	8
	Coal,	1
	Slate,	2
	Coal,	2
	Slate,	1
	Coal,	1
	Clay,	9
	Coal,	9
	Parting,	½
	Coal,	1 0
	Over-clay,	0 9'
	Breast coal,	3 4 to 3' 6"
	Parting,	½
	Bearing-in coal,	3
	Parting,	½
	Brick coal,	10 to 1 0
Parting,	½	
Bottom coal,	1 4	

Cleavage planes bear : N. 65° W. 20 feet ; N. 62½ W. 6 feet ; N. 65½ W. 3 feet ; N. 63 W. 4 feet ; N. 65½ W. 3 feet, and N. 67 W. 6 feet.



1857-1858

GILMORE'S SLIDE TIPPLE

PHOTO BY J. H. HARRIS, U.S.G.

They mine out the *breast, bearing-in* and *brick* coal members; which after screening give 66 per cent. lump and 24 per cent. of slack coal.

Daily output, 9000 bushels of lump coal.

Total area mined out, 50 acres.

110 miners, 8 drivers, and 6 day men are employed.

The mine is ventilated by a furnace at the front of the workings; 39 feet long; arched; rises six inches to the rear end; 7 feet wide; 7 feet high; with two square holes on each side and one on the top for the purpose of having cool air pass through to the stack on the outside of the furnace walls. The fire-bed is 7 feet long and 7 feet wide, and the front end of the grate-bars are 2 feet inside of the furnace front.

The furnace stack is 7 feet square in the clear, built of stone and brick, 42 feet in height, additional to a shaft through rock 32 feet in depth.

By making a direct connection with fresh air from the outside the furnace with a moderate fire showed a capacity for passing or moving 21,600 cubic feet of air per minute. By using the air from the mine it was reduced to 18,000 cubic feet per minute, which shows a loss of nearly 17 per cent of the effective power by friction in passing through the several air-courses from the inlet to the furnace.

Bottom of coal at pit mouth 140 feet above low water.

54. BISSEL MINE, (35½ miles from Pittsburgh.)

Opened by Calvin C. Bissel in 1853 and operated by him on a small scale until it was sold to Plummer and McCandles; who again sold it to Mrs. John Gilmore, the present owner, in 1863; from which time it was operated by Capt. John Gilmore, until the coal of the property was exhausted in 1874.

Whole area mined out, 90 acres.

The coal was run from the check-house down an incline tramway 400 yards in length to the tippie at the river, where it was screened into boats.

55. HESLEP MINE, (35½ miles from Pittsburgh.)

Located a short distance below North Webster, was opened up by Samuel Throp for John Heslep in 1854. It was operated by Heslep until 1860, when about 15 acres were mined out; and the remaining portion or 29 acres has since been run out through the Paynetown works, adjoining just below.

The coal was screened at the check-house near the pit mouth on the hill and run down an incline tram-road to a sliding tippie at the river.

56. PAYNETOWN MINE, (35½ miles from Pittsburgh.)

Opened by Captain John Gilmore for William Boner in 1848 and operated by Gilmore and Hunt until sold to Payne; who operated and sold to Huffman and Seibert; who operated and sold it to Jacob Tomer; who continued to run it until the coal was exhausted in 1881.

The coal was screened at the check house and run down an incline tramway to a slide tippie at the river.

Area mined out 50 acres.

Bottom of coal at the pit mouth 125 feet above low water.

57. BAKERTOWN MINE, (34½ miles from Pittsburgh.)

Was owned and opened up in 1851 by A. J. Baker, who operated until 1862 and sold it to Adam Becker & Co.; who operated until 1868 and sold to Koontz and Patterson; who run the mine for one year and leased it to Presley and David Gillingham; who operated until 1872, since when it has remained idle.

The coal was screened at the check house near the pit mouth and run in tram wagons down a short incline road to a sliding tippie at the river.

Area mined out reported at 40 acres.

58. BECKETT'S RUN MINE, (3½ miles from Pittsburgh.)

Opened up in 1871 by Rogers, Rea & Co. who built a tipple and operated until 1879, when the mine was leased to H. M. Hodgson and John Crumby, who operated until 1882.

The property now belongs to the Bank of Commerce of Pittsburgh and the works have remained idle throughout the present year.

Coal at pit mouth 73 feet above low water.

Tipple floor 50 feet above low water.

Bottom of coal at mouth of water-course 319 yards farther *up* the river, 79 feet above low water.

Bottom of coal at old pit mouth at the point of the hill 165 yards *down* the river, 50 feet above low water.

A *fault* or break in the strata at the last mentioned pit mouth has depressed the coal on the west side about 20 feet.

The same fault is observed at Sutton's pit one mile up Beckett's run.

Bearing of fault about N. 45° E.

Bottom of coal at the point of the hill on the west side of the run, 71 feet above low water.

Area exhausted at this mine 55 acres.

59. STOCKDALE MINE, (3½ miles from Pittsburgh.)

Owned by Henry Fulton and opened up by his son Abraham Fulton in 1838; the coal being run from the pit mouth down a shute to the base of the hill, where it was shoveled into a tram-wagon and hauled to the tipple at the river by horse-power; but the operation only lasted for a short time and the mine then remained idle.

It was sold to Richard Stockdale in December, 1857, but still remained unoperated until November, 1875, when Stockdale leased it to Charles Cocain and John Strope.

The lessees re-opened the mine, built a check-house, tram-road, tipple, ice-breakers and made other improvements and operated for about two years.

It was then leased to R. A. Stockdale and William Greenarch who operated for about two years.

It was then operated for a short time by Richard Stockdale the owner who leased it to the Elizabeth Coal Company with Mr. Jones as manager in 1879.

The company operated the mine until 1881 when it was sold to Jacob Tomer and Mr. McKinley who have continued to operate it to the present time.

An area of one acre was mined out by Fulton ; and thirty-five acres more since it was purchased by Stockdale.

The mine is worked on the *single-entry* system, and the ventilation is produced by furnace-power.

A *swamp* enters the mine on the west side near the head of entry No. 7 and passes through on a curved line, crossing the main entry at 500 yards from the pit mouth ; crosses entry No. 6 and entry No. 4 at 300 yards from the main entry and leaves the mine at the east side of the workings near the front of the property.

The *swamp* is about 100 yards in width and appears to increase in depth from left to right. At entry No. 4 it is 21 feet in depth ; where it crosses the main entry it is 25 feet in depth, counting from the general plane of the coal.

60. BAIRD MINE, (34½ miles from Pittsburgh.)

Located on the east side of the river ; opened by H. H. Finley for Judge T. H. Baird, in 1844 ; operated by Judge Baird until 1848 ; and by Shelton, Allen and others until 1854.

Since then the balance of the coal contained in the tract has been run out through the *Harlem mine*, at the west side of the property.

Area mined out, 25 acres.

The pit cars were run on an incline road, laid on the ground surface, from the pit mouth to the tippie at the river. They would run a train of several cars together, each car being supplied with a brake, and all of the brakes so connected with a rope that a man could ride on the hind-

most car and control or regulate the speed of the whole train as it was moved by force of gravity from the pit mouth to the river. The empty cars were hauled back to the pit mouth by a horse. This arrangement however was soon abandoned to a partial extent on account of the uncertainty of the action of the brakes at all times and the consequent danger to life and property which might result therefrom.

Instead thereof the road from the pit mouth to the base of the hill was furnished with two tracks; a check-drum with a rope was erected near the pit mouth to check the full cars down to the foot of the hill; whence they were hauled to the river by a horse. The empty cars were returned to the base of the incline, and were then lifted to the check-house by the weight of the descending full ones.

61. MILESVILLE MINE, (33½ miles from Pittsburgh.)

Opened in 1864 by George Tanner and Charles Tillinghast, who built a tipple, tramroad, 15 blocks of two-story double dwelling-houses, a store-room, residence and school-house and operated the mine for several years.

Sold in 1868 to W. N. Robbins, Robert Jenkins, and James Lynn.

Robbins subsequently sold his interest to Jenkins and Lynn, who are the present operators.

It is worked on the single entry system and ventilated by a furnace. The *old main entry* was driven against the face, through the eastern half of the tract, and connects with the outcrop in the rear by a short butt entry driven to the right.

This part of the property being exhausted a *new main entry* was started in the western half during the early part of 1883. The old tipple was removed and a new one built connecting with the new workings.

Bottom of coal at old pit mouth 62 feet above low water.

Bottom of coal at new pit mouth 56 feet above low water.

Distance between old and new pit mouths 480 yards.

Floor of new *drop* tippie 54 feet above low water.

They employ 100 miners, 6 drivers, one trapper and 7 day men, and are running 9000 bushels of lump coal daily. They report the lump coal at 66 per cent., nut 17 per cent. and dust at 17 per cent.

Area mined out, 60 acres.

The new main entry and butt entry No. 1 cross a *clay seam* five inches in thickness extending from top to bottom of the coal. The coal is curled for a distance of fifteen feet on each side of this clay seam; and the *cleavage* is very much broken and disturbed in direction.

Cleavage planes in other parts of the mine bear: N. 65½ W. 10 feet; N. 62¼ W. 10 feet; N. 64¾ W. 6 feet; N. 62¼ W. 4 feet; N. 61¼ W. 6 feet, and N. 67 W. 3 feet.

The butt entries bear N. 65½ W.

I found the section here to be as follows:

	Carbonaceous shale.	
Milesville mine Section. (Fig. 18.)	Coal,	0' 4" to 12"
	Clay,	10
	Coal,	4
	Slate parting,	½
	Coal,	4
	Slate,	2
	Coal,	1 0
	Over-clay,	1 0
	Breast coal,	3 1
	Parting,	½
	Bearing-in coal,	3
	Parting,	½
	Brick coal,	1 0
Parting,	½	
Bottom coal,	1 2	
	Calcareous clay with limestone nodules.	

62. HARLEM MINE, (34 miles from Pittsburgh.)

Opened for the late Judge Thomas H. Baird, by Samuel Throp, in 1861, who built a tippie and road, and operated under lease until 1862.

It was then leased to Elijah Harrison and Robert Greenarch, who operated a few months.

Greenarch was succeeded by Isaac Black.

Harrison and Black continued to operate until 1863.

Then the mine was leased to Thomas H. Baird, Junior, who operated until 1868.

Then it was leased to Robert Giles, who operated it until 1870.

Then it was leased to Lewis Staib, who operated it until 1874.

Then it was leased to the Harlem Coal Company, who operated until 1882.

An area of 65 acres has been mined out here, together with 5 acres purchased from Butler, and 9 acres purchased from Beazle.

The property now belongs to the heirs of Nancy Baird, widow of the above mentioned Judge H. Baird, deceased.

63. VICTORY MINE, (33½ miles from Pittsburgh.)

On the west side of the river.

Purchased from Cornelius Weygandt by Rea and Rogers in 1859.

The coal was then leased to Samuel Barnum, Ralph Miller and Jonas Crowthers who opened the mine, made the necessary improvements for running to the river trade and continued to operate until 1861; then Crowthers left the company, and Barnum and Miller continued until 1863.

Lewis Staib then bought a one third interest in the mine and operated until 1872.

The whole property was sold to James Sampson and Hiram Rabe in 1874, who sold it back to Lewis Staib in 1881.

It has not been in operation for several years.

Area of coal mined out 60 acres.

It was worked on the single-entry system. The main entry and air-course at 700 yards from the pit mouth crosses a *swamp*, which passes through the mine in an easterly and westerly direction.

64. WIER MINE, (33½ miles from Pittsburgh.)

Located at the point of the hill at the lower side of the Lower Victory hollow. This mine was owned and opened up by William Wier in 1838. It was only operated during a part of that year and the total output is said to have been only two boat loads or 6000 bushels. The property now belongs to Lewis Staib.

65. RANKIN MINE, (33½ miles from Pittsburgh.)

On the east side of the river.

Owned by M. W. Rankin, it was opened up in 1880 under a fifteen year lease by the Rankin Coal Company, composed of H. Lafferty, William Evans and Henry Rebka.

In 1883 Lafferty and Evans sold their interest to Rebka, who continues to operate the mine.

It is worked on the single-entry system. The main entry is nearly square against the faces, or cleavage, and is 150 yards in length from the pit mouth. It dips slightly from the pit mouth for a distance of 50 yards, and then rises quite rapidly to the head. Two butt entries are driven to the right and one to the left of the main entry.

They mine out the *breast*, *bearing-in* and *brick* coal members and leave the *bottom* coal undisturbed for a floor to the mine.

Area exhausted six acres.

65 miners, 3 drivers and 3 day men are employed and the daily output amounts to 4000 bushels of lump coal. They do not separate the nut from the dust coal but run it all together as slack. The total output is reported at 70 per cent for lump and 30 per cent for slack coal.

Bottom of coal at pit mouth 50 feet above low water.

Bottom of tippel floor 34 feet above low water.

No *rolls* or *horse-backs* have been observed in this mine. Several *soot veins* have been cut through; but only two *clay seams* have been found thus far. One of these clay seams bears due north and south. On its western side the coal is very much curled, and the main breast portion is reduced

eight inches below its usual thickness, as seen on the opposite side of the clay seam, while the bottom portion retains its horizontal position undisturbed except as to fracture.

No artificial means have been introduced here yet for ventilating purposes, and the air current near the outlet showed a volume of 4462 cubic feet passing per minute.

Cleavage planes in the western part of the mine bear: N. $67\frac{1}{2}$ W. 8 feet, N. $64\frac{1}{2}$ W. 3 feet and N. $67\frac{1}{2}$ W. 4 feet, and in the eastern part of the mine: N. $60\frac{1}{2}$ W. 12 feet, N. $60\frac{1}{2}$ W. 8 feet, N. 61 W. 6 feet, N. 64 W. 9 feet and N. 67 W. 10 feet.

The following section was obtained in the mine:

Carbonaceous shale.		
<i>Rankin mine</i> <i>Section.</i> (Fig. 19.)	Coal,	0' 3"
	Clay,	1 6
	Coal,	0 8
	Slate,	1
	Coal,	7
	Clay,	2
	Coal,	1 0
	Slate,	$\frac{1}{2}$
	Coal,	2
	<i>Over-clay</i> ,	0 10
	Breast coal,	3 0
	Parting,	$\frac{1}{4}$
	Bearing-in coal,	3
	Parting,	$\frac{1}{4}$
Brick coal,	1 1	
Parting,	$\frac{1}{4}$	
Bottom coal,	1 4	

66. ROBINSON MINE, (32 $\frac{1}{2}$ miles from Pittsburgh.)

It was owned and opened up by Robert Robison in 1865; and operated by him until his decease in 1869.

It was then leased by Samuel Barnum, and operated by him until 1870.

It then remained idle until 1872; when it was leased by Charles Cocain, and operated by him until 1874. The Robison Brothers then leased the mine and operated until 1875.

It then remained idle until sold to S. B. Hayes, the pres-

ent owner and operator. Thomas Hutchinson is manager in charge.

The main entry is driven nearly due south in direction, and its head stands 1,030 yards from its mouth.

A *swamp* enters the mine from the west side, at the outlet of No. 6 entry, and follows that entry in a south-easterly direction to its intersection with the main entry, 427 yards from the main pit mouth; and passes through and out at the east side of the workings into the *Victory mine*.

The mine is ventilated by a furnace with a brick stack eighty feet in height.

Eighty miners, 4 drivers, and 4 daymen are employed.

The daily output amounts to 7,000 bushels of lump coal per day.

An area of 85 acres has been mined out.

The bottom of coal is $58\frac{1}{2}$ feet above pool water.

Cleavage planes bear:

N. $66\frac{1}{4}^{\circ}$ W. 5 feet.—N. 64° W. 8 feet.

N. $66\frac{1}{2}^{\circ}$ W. 6 " —N. $63\frac{1}{4}^{\circ}$ W. 6 "

N. 65° W. 5 " —N. $64\frac{1}{2}^{\circ}$ W. 4 "

N. $63\frac{1}{4}^{\circ}$ W. 3 " —N. 63° W. 6 "

N. $63\frac{1}{2}^{\circ}$ W. 5 " —N. $64\frac{1}{4}^{\circ}$ W. 4 "

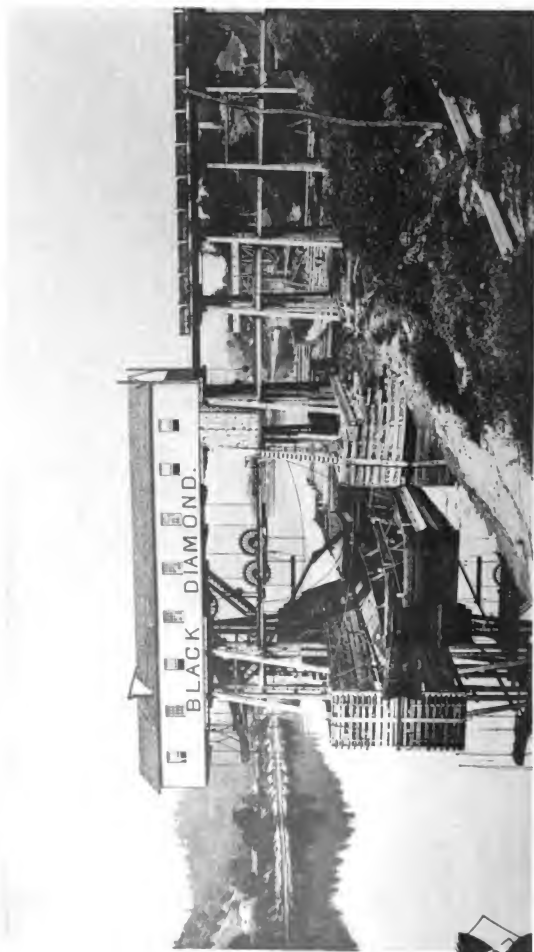
N. $64\frac{1}{2}^{\circ}$ W. 6 " —N. $64\frac{1}{4}^{\circ}$ W. 6 "

67. BLACK DIAMOND MINE, (32 $\frac{1}{2}$ miles from Pittsburgh.)

This mine was opened up in 1866 by the Black Diamond Coal and Mining Company, organized under a charter granted under the general mining laws of the State, with a capital stock of, \$300,000, divided into 30,000 shares of \$10 per share; 5,000 shares were to be used for working capital, and 2500 shares were to be used for a contingent fund.

The officers of the company were Nicholas Schneider, president; Charles Seibert, treasurer; Christian Seibert, secretary; T. Boswell Phillips, general business superintendent and Lorenz Hoffman, superintendent of mines.

The directors were Charles Seibert, Christian Seibert,



1907

BLACK DIAMOND TIPTLE.

GEORGE W. KILPATRICK, PA.

Lorenz Hoffman, T. Boswell Phillips, Joseph Reymann, Philip Eichenlaub, Nicholas Schneider, Joseph Seibert and Jacob Dressel.

Their principal office was at No. 89 Water Street, Pittsburgh.

They built a drop tipple, two blocks of eight houses, and drove some main entry, but run no coal by river. The tipple was carried away by high water in January, 1868.

In 1869 the property was sold to Wm. H. Brown, who built a slide tipple and commenced to operate in 1870; he continued to operate until about the time of his death in 1875.

It was then operated by his heirs until they leased to Lewis Staib, in November, 1878, who operated until July, 1882. It has not been in operation since that time. It still belongs to the heirs of Wm. H. Brown, deceased.

They built a new road and drop tipple during the fall of 1883, and are preparing for extensive operations.

The main entry and air-course are driven perpendicular to the faces or cleavage, with 30 feet of solid coal between them. The mine is worked on the double-entry system, with 30 feet of solid coal remaining unmined between the butt entries. It is ventilated by a furnace, a shaft and stack 100 feet in height.

An area of 116 acres has been mined out, and a larger amount remains unmined.

Cleavage planes: An average of thirty-six observations gave a bearing of N. 64 $\frac{1}{2}$ ° W.

I found No. 10 butt entry to give the same bearing for a distance of 521 feet; and No. 13 butt entry gives the same bearing for a distance of 490 feet.

The butt entries when properly driven should show the average bearing of the cleavage-planes or faces; that is, where the cleavage is not curled or otherwise disturbed by faults or clay veins.

This mine produced 67 per cent lump, 13 per cent nut, and 20 per cent dust coal, as determined from the reported yield of each kind for seven years of nearly continuous working, from September, 1871, to June, 1878.

The following section was obtained in entry No. 4, at a point where a fall in the roof exposes all of the members to view :

Shaly sandstone.			
	Carbonaceous shale,	2'	0''
	Block slate,	0	9
	Carbonaceous shale,	0	8
	Calcareous shale with nodules of iron ore,	0	5
	Carbonaceous shale,	0	3
Black Diamond mine Section. (Fig. 20.)	}	Coal,	0 2
		Slate parting,	0 ½
		Coal,	0 2
		Slate parting,	0 ½
		Coal,	0 3
		Clay parting,	0 3
		Coal,	0 3
		Slate parting,	0 ½
		Coal,	0 4
		Slate parting,	0 ½
		Coal,	0 6
		Clay parting,	0 2
		Coal,	0 10
		Slate parting,	0 ½
		Coal,	0 1
		Slate parting,	0 ½
		Coal,	0 2
		Over-clay,	0 10
		Breast coal,	3 2
		Slate parting,	0 ½
Bearing-in coal,	0 3		
Slate parting,	0 ½		
Brick coal,	1 1		
Slate parting,	0 ½		
Bottom coal,	1 2		

Clay bottom.

The bottom of the coal at pit mouth is 46 feet above low water.

68. FORT PITT MINE, (32½ miles from Pittsburgh.)

The coal and surface frontage of this mine was bought from Dr. Robert Ray by W. H. Barr, J. D. Johnson and Lewis Moule in 1863. During that year they opened the mine, built a tippie, outside road and a block of four houses and operated until 1869. Then Barr left the company and Johnson and Moule continued to operate for one year, after

which Johnson operated alone for two years, and it has not been in operation since.

The property now belongs to Malcolm Hay of Pittsburgh.

The head of the main entry and air course stands 620 yards from the pit mouth. They are driven *against the faces* or *perpendicular to the cleavage*, and parallel with each other, with 30 feet of a rib of solid coal left between them.

A *swamp* enters the mine from the western side adjoining the *Ivile* mine, crosses the main entry and air course at 330 yards from the pit mouth and is drained in the mine by means of a syphon pipe.

Thirty-five acres have been mined out.

69. IVILE MINE.

Was opened up under lease from Joseph Warne by Robert Coulter, Jonas Crowthers and Hiram Warne in the spring of 1862.

G. W. G. Payne became a member of the company in the fall of the same year and continued in the company for two years.

William Dilworth purchased a one fourth interest in the workings in 1865 and sold his interest back to the company in 1867.

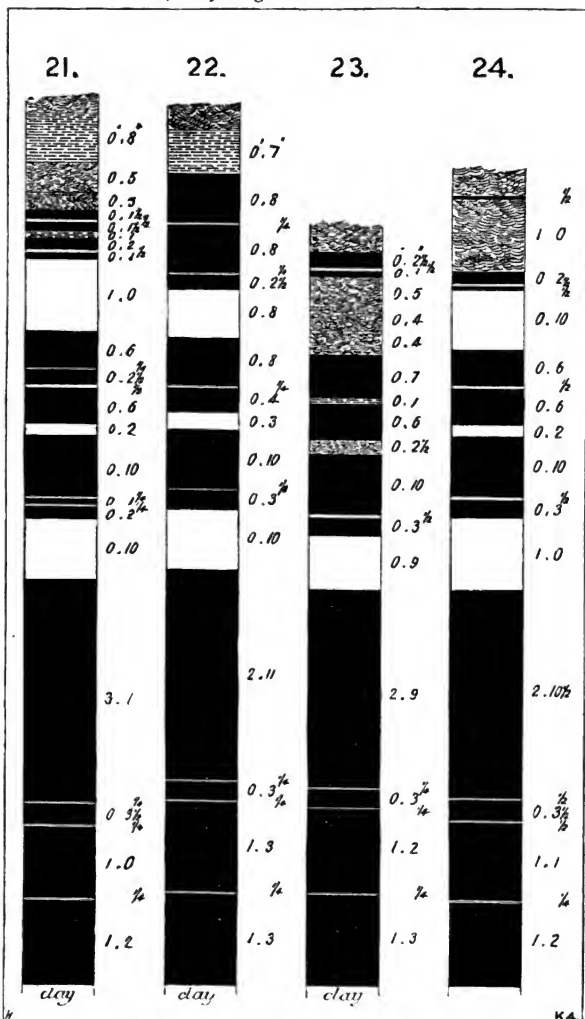
Robert Coulter sold his interest to Crowthers and Warne in the latter part of 1868.

Crowthers and Warne dissolved partnership in 1873 and Warne continued to operate until 1881, when the property was sold to James Jones, the present owner and operator.

The old tibble was burned in the fall of 1872 and a new one was built in its place soon after. James Jones placed a *stationary engine* near the pit mouth in 1882, which, in connection with a drum and wire rope, is used to haul the pit cars from a point in the mine to the tibble at the river and return them again.

He also built a *railroad tibble* at a point below the coal road to the river but has run very little coal by rail as yet.

The following section was obtained at the pit mouth :



	Carbonaceous shale.		
	Block slate,	0'	9"
	Carbonaceous shale,	0'	8"
	Sandy shale,	0	5
	Carbonaceous shale,	0	3
<i>Ivite mine</i> <i>Section.</i> <i>(Fig. 21.)</i>	}	Coal,	0 1
		Slate parting,	0 ½
		Coal,	0 1½
		Slate parting,	0 1
		Coal,	0 2
		Slate parting,	0 ½
		Coal,	0 1
		Clay,	1 0
		Coal,	0 6
		Slate parting,	0 ½
		Coal,	0 2½
		Slate parting,	0 ½
		Coal,	0 6
		Clay,	0 2
		Coal,	0 10
		Slate parting,	0 ½
		Coal,	0 1
		Slate parting,	0 ½
		Coal,	0 2
		<i>Over-clay</i> ,	0 10
Breast coal,	3 1		
Slate parting,	0 ½		
Bearing-in coal,	0 3½		
Slate parting,	0 ½		
Brick coal,	1 0		
Slate parting,	0 ½		
Bottom coal,	1 2		
	Clay bottom.		

A *swamp* enters the west side of the mine from the *New Catsburgh mine*, crosses the main entry at 370 yards from the pit mouth, and passes from the eastern part of the workings into the *Fort Pitt mine* on that side. The swamp is 30 feet in depth where the main entry crosses it and the roof of the entry has been blasted down at this point. The water that collects in the swamp is carried from the mine by means of pipes and a steam pump.

The mine is worked on both single and double-entry systems; and the ventilation is produced by furnace power.

120 miners, 5 inside drivers, 2 trappers, and 6 day men are employed; and the output amounts to 9,000 bushels of lump coal per day.

An area of 125 acres is mined out.

Cleavage planes. An average of six observations gives a bearing of N. $64\frac{1}{2}^{\circ}$ W.

Bottom of coal at pit mouth 40 feet above low water.

71. OLD CATSBURGH MINE, ($31\frac{1}{4}$ miles from Pittsburgh.)

Is situated on the west side of the river.

Owned in 1858 by Rev. John Kerr and William McClure and opened under lease from them by H. H. Finley, Jonas Crowthers and Ralph Miller. They built a tramroad, abutment, tipple, and continued to operate until 1859 when Crowthers left the company.

Finley and Miller continued to operate until March, 1864, when the property was sold to R. J. Anderson and John F. Dravo, the present owners.

They operated until April 17th of that year, when it was closed by reason of a fire in the mine. They were using a steam pump to pump the water out of the *swamp*, and the coal surrounding the furnace became fired therefrom and got such headway in a few hours during the night that it could not be extinguished without closing the mine, which was done, and it has remained closed ever since.

The *swamp* passes through the old workings in such a way as to cut the fired region off from the main body of the coal and *the water which collects in this swamp prevents the fire from crossing over it.* The fire is thought to be burning yet.

The property is now leased to Lewis Staib and the coal is run out through the workings of the *New Catsburgh mine.*

The area exhausted amounts to 100 acres.

71. NEW CATSBURGH MINE, (31 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river. Opened in 1879 by Lewis Staib; it has been owned and operated by him ever since.

It is operated on the single-entry system and the coal is

run to the river trade. It is operated in connection with the *Old Catsburgh mine* and the coal of both mines is run out through the workings of the new mine. The coal is hauled by mules from the working places to a parting between entries No. 8 and 9, at a distance of 770 yards from the pit mouth, whence it is transported to the tippie at the river by means of a stationary engine (and wire line) located at the pit mouth.

They haul out 30 cars at a trip in this way.

A *swamp twenty-five feet in depth* enters the workings of the *Old mine* at a point in front near the present cemetery gate, crosses the old main entry of that mine, also the main entry of the *New mine*, at a point 400 yards from the pit mouth, also the center entry, 160 yards to the left of the new main entry (at the junction of No. 4 butt entry), and follows nearly parallel with that entry until it crosses the line air course, and from thence it passes into the *Ivile mine*.

Its axis describes nearly a quarter circle through the two mines.

Another *swamp*, three feet in depth, passes through the advance workings of both mines; and crosses the main entry of the *new mine* 500 yards ahead of the large swamp; describing a curve about parallel with the axis of the first named swamp.

A third swamp occurs about 400 yards in advance of the second. It is fifteen feet in depth; crossing the extreme head of the present advance workings, in a direction approximately parallel with the small (second) swamp.

The roof of the main entry in the first swamp was blasted down in order to raise the hauling road up to grade.

This mine is ventilated by means of a *fire basket*, and a shaft, and stack 60 feet high. The fresh air enters the mine through entry No. 11, at the extreme head of the workings. This entry is driven out to the coal crop near the mouth of Scott run on Pigeon creek.

They employ 170 miners, 8 inside drivers and 6 day men. The daily output amounts to 10,000 bushels of lump coal per day; and the total area mined out is 70 acres.

Clearance planes bear :

N. 64½ W. 6 feet	N. 63½ W. 7.
N. 65½ W. 8 "	N. 66½ W. 5.
N. 65 W. 10 "	N. 66½ W. 4.
N. 66½ W. 6 "	N. 64½ W. 5.
N. 62½ W. 4 "	N. 64½ W. 9.
N. 62 W. 5 "	N. 64½ W. 8.
N. 65½ W. 6 "	N. 64½ W. 7.

Slate cleavage observations give : N. 44° W. and 35½° W.

The following section of coal members was obtained at the pit mouth :

	Sandy shale.	
	Block slate,	0' 7"
	Carbonaceous shale,	0 8
	Slate,	0 7
New Catsburg mine Section. (Fig. 22.)	Coal,	0 8
	Slate parting,	0 ½
	Coal,	0 8
	Parting,	0 ½
	Coal,	0 2½
	Clay,	0 8
	Coal,	0 8
	Parting,	0 ½
	Coal,	0 4
	Clay,	0 3
	Coal,	0 10
	Parting,	0 ½
	Coal,	0 3
	Over-clay,	0 10
	Main breast coal,	2 11
	Parting,	0 ½
	Bearing-in coal,	0 3
	Parting,	0 ½
Brick coal,	1 3	
Parting,	0 ½	
Bottom coal,	1 3	

Under clay.

I found the section at the bottom of the main swamp to be the same as that obtained at the pit mouth, dip to the top of the *block* slate; and above that the members were concealed.

The foregoing bearings on *slaty cleavage* were obtained on the center entry at a point where a small indefinite *swamp* crosses that entry and near the front part of the

mine. At this point a portion of the roof members have been blasted down, which exposes the shale over the block slate for a height of three feet in the deepest part of the swamp.

The cleavage here commences at the top of the block slate and extends upwards through the overlying shale for about five feet. The cleavage planes occur at intervals of from one inch to five feet, cleaving the shale into slabs perpendicular to its bedding. Those planes which are only a few inches apart are perfectly parallel with each other as far as exposed to view across the width of the entry; those that are several feet apart are found to vary slightly in direction, as indicated by the foregoing bearings, which are taken for the extremes.

Bottom of coal at pit mouth, 49 feet above pool water.

72. BAKEWELL MINE, (30½ miles from Pittsburgh.)

Situated on the east side of the river.

Was owned in 1847 by James Manown, Sr., and opened under lease by H. H. Finley; who operated until 1849 and run to the river trade.

The coal was run from the pit mouth into the boats at the river by means of a large and a small chute. A screen was placed in the small chute next to the boats. The lump coal was the only portion loaded for market, and the slack, or the portion that passed through the screen, was cast aside as worthless.

Bottom of coal 82½ feet above low or pool water.

The property now belongs to the Bakewell heirs.

73. DRY RUN MINE, (30½ miles from Pittsburgh.)

Located in the west end of Monongahela City.

Opened in 1862 by Dr. R. F. Biddle and E. W. Tower, who built an inclined tram road and an abutment tippie at the river and run coal to the river trade until 1863.

Then operated a few months by Alexander Crumby under lease.

Sold in 1864 to Joseph Haigh, who operated until 1870.

Then sold to I. N. Holmes and Sons of Pittsburgh, since which time it has only been operated for the local trade of the city.

H. H. Finley is superintendent in charge of the mine and property connected therewith.

Area mined out 60 acres.

Bottom of coal at pit mouth 81 feet above low water.

The following section was obtained at the pit mouth :

Carbonaceous shale.				
<i>Dry Run mine Section. (Fig. 23.)</i>	}	Coal,	0' 2½"	
		Slate parting,	0 ½	
		Coal,	0 1	
		Clay shale,	0 5	
		Carbonaceous shale containing nodules		
		of iron ore,	0 4	
		Clay shale,	0 4	
		Coal,	0 7	
		Slate parting,	0 1	
		Coal,	0 6	
		Clay shale,	0 2½	
		Coal,	0 10	
		Slate parting,	0 ½	
		Coal,	0 3	
		Over-clay,	0 9	
		Breast coal,	2 9	
		Slate parting,	0 ¼	
		Bearing-in coal,	0 3	
Slate parting,	0 ¼			
Brick coal,	1 2			
Slate parting,	0 ¼			
Bottom coal,	1 3			

Cleavage planes bear:

N. 63¼ W. 10 feet—N. 65 W. 6 feet.

N. 64 W. 8 " —N. 64½ W. 7 "

60. NEW EAGLE MINE, (29½ miles from Pittsburgh.)

Opened up in 1863 by the owners, Hopkins and Irish, who, in 1864, leased it to Jenkins, Nish and Company, who built the outside road, 400 yards in length, an abutment tipple; made sundry other improvements. and worked the

mine for two years; after which Hopkins and Irish operated for a few months and leased it to Rogers and Wallace; who operated until 1869, and sub-leased it to Lindsay and McCuchon; who operated until the expiration of the original lease.

Lindsay and McCuchon then leased it from the present owner, the Hon. James H. Hopkins of Pittsburgh, and continue to operate.

About 105 acres have been mined out and the coal is run to the river trade.

The coal is transported in pit wagons from the interior of the mine to the pit mouth by mule power, and from thence to the tipple by means of a stationary engine and wire rope. The engine is located near the pit mouth, and the loaded cars run by gravity down to the tipple at the river, carrying one end of the line with them. The empty cars are returned to the pit mouth by means of the engine and wire line.

The floor of this mine is quite undulating. Numerous light *rolls* pass in various directions, producing corresponding *swamps* or depressions, which render drainage at times somewhat difficult.

A *fault* or break passes through the eastern side of the workings in an (approximately) north and south direction, throwing the coal down on that (E.) side from two to six feet.

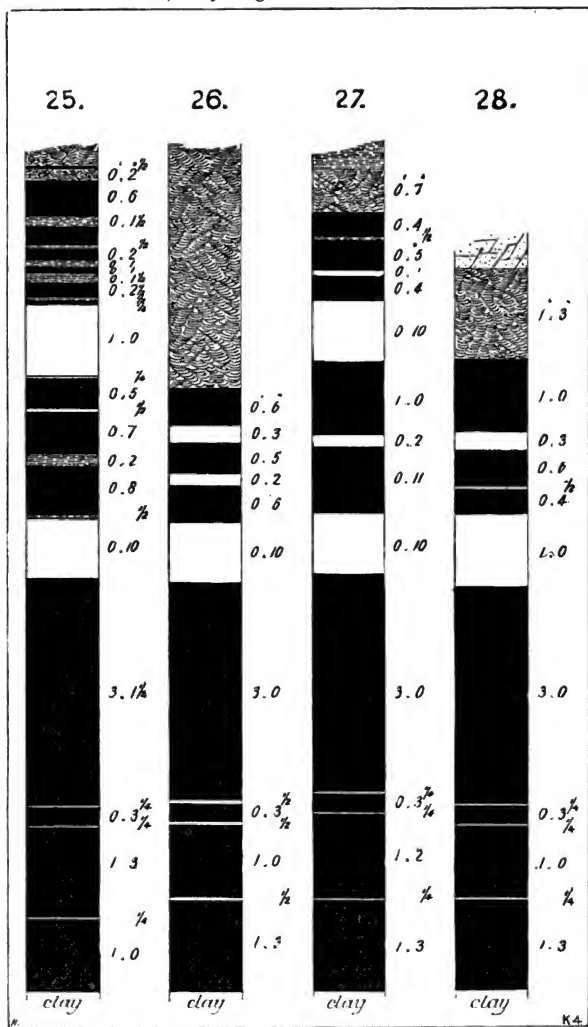
The head of the present workings is 700 yards from the pit mouth.

They employ 65 miners, 4 inside drivers, and 4 day men, and the output averages 5000 bushels of lump coal per day.

Cleavage planes in the coal observed as follows:

N. 63 $\frac{1}{4}$ W. 4 feet	—N. 63 $\frac{1}{4}$ W. 8 feet.
N. 66 $\frac{1}{4}$ W. 4 "	—N. 63 $\frac{1}{4}$ W. 5 "
N. 64 W. 4 "	—N. 63 $\frac{1}{4}$ W. 10 "
N. 64 W. 6 "	—N. 65 $\frac{1}{4}$ W. 5 "
N. 64 $\frac{1}{2}$ W. 5 "	—N. 63 $\frac{1}{2}$ W. 8 "
N. 67 $\frac{1}{4}$ W. 3 "	—N. 65 $\frac{1}{2}$ W. 8 "

Bottom of coal 60 $\frac{1}{2}$ feet above pool water.



The following section was obtained on the main entry at a point 100 yards from the pit mouth :

	Carbonaceous shale.	
<i>New Eagle mine Section.</i> <i>(Fig. 24.)</i>	Coal,	0' ½"
	Carbonaceous shale,	1 0
	Coal,	0 2
	Slate parting,	0 ½
	Coal,	0 ½
	Clay,	0 10
	Coal,	0 6
	Slate parting,	0 ½
	Coal,	0 6
	Clay shale,	0 2
	Coal,	0 10
	Slate parting,	0 ½
	Coal,	0 3
	Over-clay,	1 0
	Main breast coal,	2 10½
	Parting,	0 ½
Coal,	0 3½	
Parting,	0 ½	
Brick coal,	1 1	
Parting,	0 ½	
Bottom coal,	1 2	
	Under-clay.	

75. MINGO MINE, (29½ miles from Pittsburgh.)

Located in the town of Riverview.

Opened in 1847 by B. F. Bently and John Caldwell ; who built a tipple and road and operated until 1849.

B. F. Bently then leased it to a company, who operated until 1851.

This company sold their lease to Samuel Hamilton, who operated until December, 1852.

Then the remaining portion of the coal, improvements and river frontage was sold to Alexander Wilson and Rev. John Kerr, who built a new road, tipple and a number of dwelling houses ; also the tow-boat "*Alexander Wilson,*" and operated for two years.

In 1855 the property was sold to Henry Graff ; who leased it to Rogers, Rea and Smith ; who operated until 1863.

Then it was sold to the Mingo Coal Company, composed of Dr. Anderson, of Bedford Springs, George Black, John

R. McCune, John Smith and others; who in 1865 built the tow-boat "*Reindeer*;" also, about forty coal boats, barges and flats; and operated until 1867.

Then they sold the property to Henry Lloyd. It then remained idle until 1869, when it was leased to Lewis Staib and Thomas Hutchinson; who operated until February 22, 1874.

Thomas Hutchinson then leased the mine and operated until July, 1877; since when it has remained idle.

Carbonaceous shale.

<i>Mingo mine</i> Section, No. 1. (Fig. 25.)	}	Coal,	0'	$\frac{1}{2}$ '
		Clay shale,	0	2
		Coal,	0	6
		Clay slate,	0	$1\frac{1}{2}$
		Coal,	0	3
		Slate parting,	0	$\frac{1}{2}$
		Coal,	0	2
		Slate parting,	0	1
		Coal,	0	1
		Slate,	0	$1\frac{1}{2}$
		Coal,	0	$2\frac{1}{2}$
		Slate,	0	$\frac{1}{2}$
		Coal,	0	$\frac{1}{2}$
		Clay,	1	0
		Slate parting,	0	$\frac{1}{4}$
		Coal,	0	5
		Slate parting,	0	$\frac{1}{2}$
		Coal,	0	7
		Clay slate,	0	2
		Coal,	0	8
		Slate,	0	$\frac{1}{2}$
		Over-clay,	0	10
		Breast coal,	3	$1\frac{1}{2}$
Slate parting,	0	$\frac{1}{4}$		
Bearing-in coal,	0	3		
Slate parting,	0	$\frac{1}{4}$		
Brick coal,	1	3		
Slate parting,	0	$\frac{1}{4}$		
Bottom coal,	1	0		

Under-clay containing limestone nodules.

About 100 acres have been mined out and 600 acres remain unmined.

A *swamp* enters this mine from the west side; crosses the main entry at 65 yards from the pit mouth, where it is four feet deep; and *passes through the workings in a semi-circular manner, gradually growing deeper, until it*

connects with a circular basin 23 feet in depth and 192 yards in diameter.

This happens at a point on the main entry 780 yards from the pit mouth.

Another swamp enters this basin at its western side, opposite to where the first one enters.

A third swamp, seven feet in depth, connects with the basin on the south side and continues in a southerly direction through the mine, so far as it has been developed.

Bottom of coal at pit mouth, 60 feet above low water.

The following section was obtained at the pit mouth :

Another section I got at the back pit mouth, where the main entry crosses over Keenan's run, and within the before-mentioned basin, as follows :

	Sandstone.		
	Plant shale,	1'	6"
	Sandstone,	15	8
	Carbonaceous shale,	6	0
	Coal,	0	6
	Clay parting,	0	3
	Coal,	0	5
	Clay parting,	0	2
	Coal,	0	6
	Over-clay,	0	10
Mingo mine Section, No. 2. (Fig. 26.)	Breast coal,	3	0
	Slate parting,	0	$\frac{1}{2}$
	Bearing-in coal,	0	3
	Slate parting,	0	$\frac{1}{2}$
	Brick coal,	1	0
	Slate parting,	0	$\frac{1}{2}$
	Bottom coal,	1	3
	Clay bottom.		

76. MURE MINE, (29 miles from Pittsburgh.)

Situated on the east side of the river.

Opened in 1844 by James Mure and James Robertin ; who operated under lease from J. Gardner, in a small way, until 1846.

This mine is now an entrance to the eastern main entry of the *Old Eagle mine*.

The property belongs to the heirs of Wm. H. Brown, deceased.

77. OLD EAGLE, (28½ miles from Pittsburgh.)

Located on the east side of the river.

Opened in 1861 by Jenkins, Hill, Nish & Co., under lease from Captain William Parkinson. They built an abutment tipple and operated until 1863. They then bought the property and operated until 1867.

Sold in 1868 to William H. Brown, who operated until his death in 1875, and since then it has been operated by his heirs.

During Mr. Brown's lifetime the mine was greatly enlarged by the purchase of other tracts adjoining in the rear. The old tipple was removed and a new one built in its place during the summer of 1882.

The mine is worked on the double-entry system and at present is divided into three divisions by two main entries.

The mouth of the one entry is in line with the tipple and an air course is driven along parallel with it with a rib of about 40 feet of solid coal remaining between them. This entry and air course starts from the front at the bottom of the *main swamp* and follow in its course for about 300 yards, after which they gradually ascend its western slope and pass out of it on that side.

The other main entry starts at a point 450 yards farther up the river and is driven perpendicular to the faces or cleavage. The coal is hauled over an outside road from this entry and the eastern part of the mine to the tipple house, a distance of 900 yards, by a *compressed air locomotive*, which is also used to haul the cars from the first named main entry, the distance traveled by it in both cases being about the same.

This *locomotive* consists of two cylinders, each 22 feet in length and 36 inches in diameter, placed on a truck or carriage side by side, which, together with its levers, connections, and other necessary parts, amounts to 27 feet in total length. It is charged by the use of a high and a low pressure air engine run by steam power stationed near the pit mouth. The amount of pressure used, as indicated by the air gauge, is 400 pounds per square inch.



8515108

COMPRESSED AIR LOCOMOTIVE, OLD EAGLE MINE.

PA. STATE GEOL. SURV. CO. 4

The locomotive makes a round trip in from seven to ten minutes, which reduces the pressure to about 250 pounds.

They haul out 30 full cars at a trip and the superintendent, Mr. Robert Parry, informs me that they can easily haul 50 cars at a time. He also says that a locomotive with cylinders of 15 feet in length and 3 feet in diameter would be sufficiently large for this mine.

A clear entry way eight feet wide and six feet high is necessary for the safe passage of the locomotive where the track is straight; and where the entry is curved a somewhat larger opening is required.

Mules are used in the mine to distribute the empty cars through the workings, and collect the loaded ones together into trains at the parting, from whence they are taken by the locomotive.

Bottom of coal at pit mouth of the western or *old main* entry, 38 feet above low water.

This pit mouth is at bottom of the *main swamp*, which passes through the mine a distance of 600 yards (so far as it has been developed) on a bearing of N. 53° E. It is 200 yards wide and from 20 to 30 feet deep.

A *smaller swamp* about six feet in depth is found in the western part of the mine, which enters the front at a point 200 yards west of the main swamp, and passes through the workings on a bearing of N. 20° E. to a distance of 600 yards.

At about half way up the eastern slope of the main swamp I find a *fault*, which breaks and throws the coal down about five feet on entry No. 5. This fault runs parallel with the axes of the swamp, and extends for a distance of 300 yards.

About 50 yards east of this break and near the eastern edge of the swamp, I find *another fault*, which displaces the roof coal and the upper portion of the main breast six inches—the *down throw* in both cases being on the side of the swamp.

Clay veins were noticed in other parts of the mine extending in various directions.

The *Cleavage planes* in the western part of the mine are 6 K'.

short and much curled, the openings being frequently filled with plates of calcite. The following bearings were obtained :

- N. 62½ W. 3 feet—N. 61 W. 6 feet.
- N. 65 W. 5 “ —N. 64¼ W. 4 “
- N. 64½ W. 4 “ —N. 62 W. 6 “

In the eastern part of the mine bearings were obtained as follows :

- N. 64¼ W. 6 feet—N. 64½ W. 6 feet.
- N. 63½ W. 5 “ —N. 64¾ W. 4 “

The best cleavage here appears to occur in the upper part of the main breast coal.

The following section was obtained near the furnace and outside of the swamp :

	Sandstone.		
	Block slate,	5' 1"	
	Carbonaceous shale,	0 7	
<i>Old Eagle Mine Section. (Fig. 27.)</i>	}	Coal,	0 4
		Slate parting,	0 ½
		Coal,	0 5
		Clay,	0 1
		Coal,	0 4
		Clay,	0 10
		Coal,	1 0
		Clay,	0 2
		Coal,	0 11
		Over-clay,	0 10
		Breast coal,	3 0
		Parting,	0 ½
		Coal,	0 3
		Parting,	0 ½
		Coal,	1 2
Parting,	0 ½		
Coal,	1 3		
	Under clay.		

The ventilation is produced by furnace power. The furnace is built of brick, arched, 29 feet long, 6½ feet wide, and 8 feet high from the floor. The fire bed is 13 feet long. The furnace stack is built of stone and brick, and 110 feet in height. The distance traveled by the air from the inlet to the furnace is 3200 yards. With a moderate fire in the furnace the air current was found to be moving at the rate of 19,337 cubic feet per minute ; and by making a direct

connection with the outside air at a point near the furnace it was found to pass 28,892 cubic feet per minute.

Area mined out 101 acres.

The coal is run to the river trade.

98 miners, 5 drivers, 1 trapper and 7 day men ; and the output amounts to 7,000 bushels of lump coal per day. The total product gives a yield of 66 per cent lump, 17 per cent nut and 17 per cent dust coal.

78. COURTNEY MINE, (28½ miles from Pittsburgh.)

Owned by John L. George & Co., and opened under lease in January, 1879, by Hugh Craig & Co., who built a railroad tippie and shipped the coal by rail ; and operated until April, 1880.

Then the mine was leased to Berry, Cook & Co., who operated until February, 1882.

Then the mine was leased to the Courtney Coal Company, who operated until 1883.

At present it is operated by John L. George and J. F. Kennedy, who continue to ship by rail.

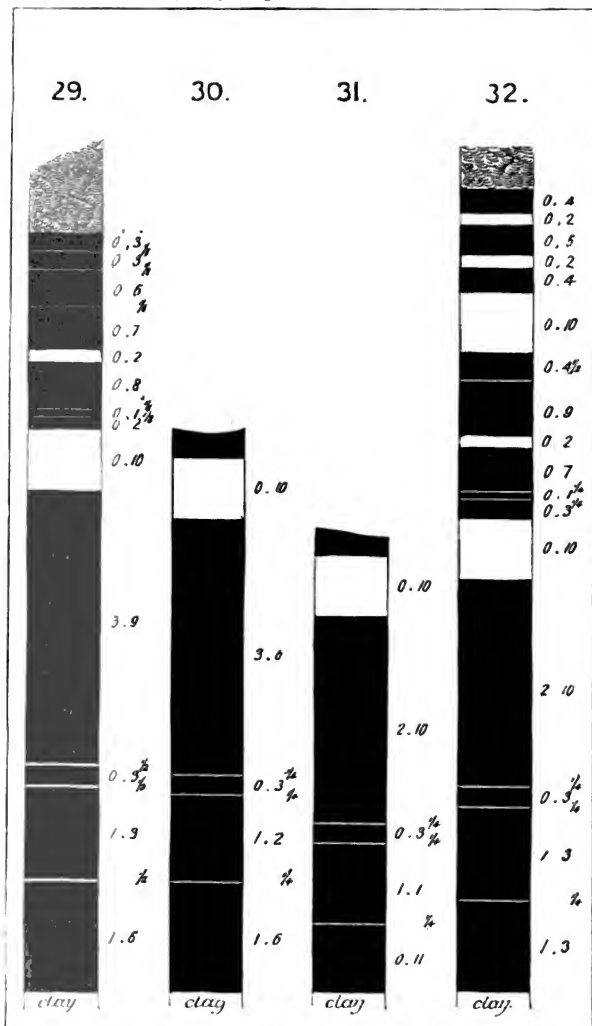
The coal is hauled from the working places of the mine to the bottom of the *swamp* on the main entry by mules, and from there the cars are hauled out to the tippie house by means of a stationary engine and a wire rope placed near the pit mouth.

The main entry is driven on the butts N. 66½ W. to the bottom of the *swamp* ; and from there it follows approximately in the swamp, which passes through the mine on a bearing of S. 61° W. This is the *same swamp* that is found crossing the main entry of the *Garfield* mine, and appears to be the same that passes through the *Old Eagle* mine on the other side of the river. It is 25 feet deep and 200 yards wide in this mine.

The mine is worked on the double-entry system and is ventilated by furnace power.

Area mined out 51½ acres.

They employ 50 miners, 4 drivers, and 8 day men, and



the output of lump coal is 4000 bushels per day. Since its opening the mine has produced 100,000 bushels of lump coal per acre. The entire product of the mine after screening gives 66 per cent lump, 14 per cent nut, and 20 per cent dust coal.

The following section was obtained at the pit mouth:

	Sandstone.		
	Carbonaceous shale,	1' 3"	
Courtney mine Section No. 1. (Fig. 28.)	{	Coal,	1 0
		Clay,	0 3
		Coal,	0 6
		Slate parting,	0 $\frac{1}{2}$
		Coal,	0 4
		Main over-clay,	1 0
		Breast coal,	3 0
		Parting,	0 $\frac{1}{4}$
		Bearing-in coal,	0 3
		Parting,	0 $\frac{1}{4}$
		Brick coal,	1 0
		Parting,	0 $\frac{1}{4}$
	Bottom coal,	1 2	
	Under-clay.		

A section in the swamp is as follows:

	Sandstone.		
	Carbonaceous shale.		
Courtney mine Section No. 2. (Fig. 29.)	{	Coal,	0 3
		Parting,	0 $\frac{1}{16}$
		Coal,	0 3
		Parting,	0 $\frac{1}{16}$
		Coal,	0 6
		Parting,	0 $\frac{1}{16}$
		Coal,	0 7
		Clay,	0 2
		Coal,	0 8
		Parting,	0 $\frac{1}{16}$
		Coal,	0 1
		Parting,	0 $\frac{1}{16}$
		Coal,	0 2
		Main over-clay,	0 10
		Breast coal,	3 9
		Parting,	0 $\frac{1}{2}$
		Bearing-in coal,	0 3
		Parting,	0 $\frac{1}{2}$
Brick coal,	1 3		
Parting,	0 $\frac{1}{2}$		
	Bottom coal,	1 6	
	Under-clay.		

Bottom of coal at pit mouth $19\frac{1}{2}$ above railroad grade, and

52 feet above pool water. Bottom of swamp 26 feet above pool water, where it enters the outcrop 140 yards down the river from the main pit mouth.

79. BLACK HILLS MINE, (28½ miles from Pittsburgh.)

It was opened up in Dec. 1878, by the Dewar Brothers, who operated it under lease from Byers, Scott and Miller until Dec. 1879.

It was then leased by Miller & Co., who operated until 1883, when the remaining coal and property was sold to J. F. Kennedy. The coal was transported entirely by rail, and sold principally at South Pittsburgh.

The following statement of annual output has been furnished to me by I. B. Miller from the books of the Company:

	Lump coal.	Nut coal.	Dust coal.
Dec. 1878,	11,222 bushels.	Not reported.	Not reported.
1879,	176,084 "	" "	" "
1880,	467,754 "	" "	" "
1881,	494,803 "	100,993 bushels	126,123 bushels.
1882,	393,724 "	77,390 "	83,848 "
1883,	27,551 "	Not reported.	Not reported.
	1,571,138 bushels	178,383 bushels	209,971 bushels

The area of the workings amounts to 18 acres by actual survey, including the ribs and pillars that remain unmined, amounting to 31 per cent of the whole area.

This gives a yield of 87,285 bushels of lump coal per acre for the area.

By excluding the ribs and pillars we get a yield of 126,500 bushels per acre.

By adding together the reported amounts of lump, nut and dust coal for the years of 1881 and '82, we find the percentage of lump coal to be 69½, nut coal 14, and the dust coal 16½.

The main breast, bearing-in, brick and bottom coal members were all mined out here, averaging 4½ feet in height.

80. BARR MINE, (28 $\frac{1}{2}$ miles from Pittsburgh.)

Located on the west side of the river, between the *Black Hills* and *Garfield* mines.

Opened in 1825 by R. Barr, who operated in a primitive manner for a few years, and then the property passed into possession of F. Gardner, who sold it to George Yohe.

Yohe sold it in 1836 to Robert Bryant, who operated until 1846.

The coal was transported from the mine to river on road-wagons and sleds, and loaded into boats at the mouth of the small run that passes near the pit mouth.

Two acres were mined out, and the property now belongs to James Craig.

81. GARFIELD MINE, (28 $\frac{1}{2}$ miles from Pittsburgh.)

Located on the west side of the river.

Opened during the early part of 1879 by John T. Huston & Co., in a tract of coal bought by them from James Craig containing 8 $\frac{3}{4}$ acres. The surface front belonged to William Huston. They built an abutment tippie and tramroad, and leased a tract of coal adjoining the other on the west side from N. Holmes & Son. They operated in the Craig tract and extended a butt entry into the Holmes tract, so as to connect with the main entry of the old Holmes mine.

They operated until August, 1881.

Then the property of John T. Huston & Co., and William Huston was sold to J. B. Finley; who also sold the same to Jordon S. Neel during the same year.

The coal of the Craig tract is all mined out and J. S. Neel is working the Holmes coal under lease.

This mine is operated on the double-entry system and ventilated by furnace power. The main entry and air course are being driven parallel to each other, on a bearing of S. 13° W., with forty feet of solid coal left unmined between them. The butt entries are driven in pairs with thirty feet of a rib remaining between them.

The main entry and air course cross the *same swamp*

that is found in the Old Eagle and Courtney mines, at a distance of 1390 yards from the pit mouth. At this point I find the *swamp* to be fourteen feet deep and two hundred and seventy yards across it. This is the head of the present workings and they are preparing to blast the roof of the entries down in the swamp and raise the track to grade.

Butt entries No. 21 and 22 are driven from the main entry at the bottom of the *swamp*, and they propose constructing arches or bridges at the mouths of these entries, so as to preserve an open passage way under the main entry and thereby enable them to mine out that part of the coal which is inclosed within the *swamp* with greater ease.

I find a section of the main coal members in the bottom of the swamp to be:

<p><i>Garfield mine</i> Section No. 1. (Fig. 30.)</p>	{	Roof coal.	
		Over-clay,	0' 10"
		Breast coal,	3 6
		Parting,	0 ¼
		Bearing-in coal,	0 3
		Parting,	0 ¼
		Brick coal,	1 2
		Parting,	0 ¼
		Bottom coal,	1 6

Under-clay.

And on the north margin of this swamp it is as follows:

<p><i>Garfield mine</i> Section No. 2. (Fig. 31.)</p>	{	Roof coal.	
		Over-clay,	0' 10"
		Breast coal,	2 10
		Parting,	0 ¼
		Bearing-in coal,	0 3
		Parting,	0 ¼
		Brick coal,	1 1
		Parting,	0 ¼
		Bottom coal,	0 11

Under-clay.

The Craig tract has all been mined out, except some ribs and pillars, and about forty acres out of the Holmes tract.

Bottom of coal at pit mouth, 34 $\frac{1}{2}$ feet above pool water, and 2½ feet below railroad grade.

They employ 125 miners, 8 drivers and 6 day men, and the output amounts to 8500 bushels of lump coal per day.

82. HOLMES MINE, (28 $\frac{1}{4}$ miles from Pittsburgh.)

Located between the Buffalo and the Garfield mines.

Owned and opened in 1852 by Dr. Merrett, who operated it until 1854, after which it was sold to N. Holmes & Son, of Pittsburgh, the present owners.

It then remained idle until 1879, when the remaining coal was leased to John T. Huston & Co., who ran the coal out through the Garfield mine and operated until August, 1881.

Since then it has been operated by Jordon S. Neel, under lease.

The present furnace and stack of the Garfield mine is located near the pit mouth of this mine, and the old main entry has been driven forward and at present is used as an air-course for the Garfield mine.

An area of four acres was mined out.

83. BUFFALO MINE, (28 $\frac{1}{4}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened up in 1846 by Anderson and Lindsay, who ran the coal to the river trade and operated until 1853. It was then called the *Cleveland mine*.

Chamberland and McDonald operated the mine until 1857.

It was then leased to Finley and Miller, who operated about two years.

John Dippold & Co. bought the property in 1860, and named it the *Tigress mine*, and operated until 1863.

After that it was operated by Adam Apple and John Dippold until 1866.

Adam Apple then leased the mine from John Dippold, who had become sole owner, and operated until 1873.

It was then sold to the Buffalo Coal Company, (at which time it was named the *Buffalo mine*.) who abandoned the river trade, built a railroad tipple, and operated by rail until 1875.

It was then leased to Wolf, Walters and Meyers, who operated until 1877.

William Huston and Hugh Flanagan operated for a few months, and then it was leased to J. J. Staitler, who is the present owner and operator. He bought the property in 1881.

The mine is worked on the double-entry system. The main entry and air-course are 1825 yards in length to the head. A butt entry is driven from near the head of the main entry, from which a face entry is driven to Froman's run.

At the head of the last-named entry a shaft has been sunk to a depth of 60 feet and connects with the entry. A *Champion fan* six feet in diameter is placed at the top of the shaft and run by steam. It is used as an exhaust fan at present, but can be used either to exhaust the air from or to force it into the mine. The fresh air enters the pit mouth at the river front. At the time of my visit, January 21, 1884, the fan was being run at the rate of 100 revolutions per minute which, according to the anemometer, gave an exhaustion of 14,850 cubic feet of air per minute.

The fan was run by steam from a double-flued boiler 20½ feet in length and 3 feet in diameter. The boiler also supplied the steam to run a No. 4 *Blake steam pump*, located at the sump near the foot of the shaft.

The thermometer indicated four degrees below zero outside of the mine, and I noticed frost on the roof and sides of the main entry at a distance of one half mile from the pit mouth.

The coal is hauled from the mine by mule power. 85 miners, 2 trappers, 6 drivers, and 10 day men are employed. Four mules are used to collect the loaded cars into trains and distribute the empty cars through the workings, and four mules are used to haul the trains out, with two mules to a train.

The daily output amounts to 6500 bushels of lump coal per day. During the summer they run by rail to the lake trade and during the winter they run on orders for gas coal from Cleveland and Toledo. The nut and dust coal are sold at present to the Edgar Thompson Steel Works at Braddock and the Pittsburgh trade. The run of the mine gives

66 per cent lump, 17 per cent nut, and 17 per cent dust coal.

At this time the loaded pit cars are hauled from the pit mouth up an inclined tramway to the tippie by means of a stationary engine and wire rope, but they are arranging to build a new tippie with a perpendicular lift.

Floor of present tippie 25 feet above railroad grade.

Numerous *clay veins* and *spars* are found in this mine. I noticed one clay vein that displaced the roof coal ten inches but did not fracture the main breast coal to a greater depth than two feet. They cause no serious inconvenience in mining here, however.

The following section of the coal members was obtained near the pit mouth :

	Carbonaceous shale.	
	Coal,	0' 4'
	Clay,	0 2
	Coal,	0 5
	Clay,	0 2
	Coal,	0 4
	Clay,	0 10
	Coal,	0 4 to 0' 5"
	Slate parting,	0 ↓
	Coal,	0 9
	Clay,	0 0 to 0' 4"
	Coal,	0 7
Buffalo mine Section. (Fig. 32.)	Parting,	0 ↓
	Coal,	0 1
	Parting,	0 ↓
	Coal,	0 2 to 0' 4'
	Main over-clay,	0 10
	Breast coal,	2 10
	Parting,	0 ↓
	Bearing-in coal,	0 3
	Parting,	0 ↓
	Brick coal,	1 3
	Parting,	0 ↓
	Bottom coal,	1 3
	Under-clay.	

Cleavage planes. I obtained the following bearings :

N. $67\frac{1}{4}^{\circ}$ W. 4 feet at a point 20 feet from a clay vein. N. $63\frac{1}{4}^{\circ}$ W. 6 feet at a point 60 feet on the other side of the same clay vein.

This last cleavage plane was curled or curved to the extent of $\frac{3}{4}$ of an inch from a straight line in its whole length.

The bearings obtained at another point where clay veins were not observed are :

N. $62\frac{1}{2}^{\circ}$ W. 6 feet—N. 64° W. 4 feet.

N. 71 W. 6 “ —N. $62\frac{1}{2}$ W. 6 “

All of the clay partings in the roof member appear to be subject to sudden variations in thickness, amounting sometimes to small *horse-backs*, resulting in depressions in the under side of the roof coal, and a consequent variation in the thickness of the main breast coal member. Sometimes, however, this depression of the roof coal only affects the thickness of the main over-clay, making it to vary from six to ten inches in thickness.

Area mined out 180 acres.

Bottom of coal at pit mouth, $35\frac{1}{2}$ feet above pool water, and 4 feet below railroad grade.

84. LYSLE MINE.

Located about fifty yards below the Buffalo Mine.

Opened in 1842 by George Lysle, who operated for about two years only. The coal was run to the river trade, and the property is now included in the *Buffalo mine*. His sons Addison and George, Jr., are now operating the *Camden Mine*, near Camden Station.

85. NEW CINCINNATI MINE, ($28\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1854 by Capt. Wm. Ferree, for the Cincinnati Coal Company, who built an abutment tippie and operated until 1855 ; and leased it to George Campfield, who operated until 1860.

It was then leased to George Groves, Louis Moule, and George Ordner ; after which W. H. Barr was added to the company, which operated until 1862.

Then the property was sold to Armstrong and Herron, who in 1863 sold it to John Dippold, John L. Porter, R. G. Herron, and Wm. A. Herron, who operated until 1865,

when Dippold bought the interests of his partners and leased the mine to William Huston and R. G. Herron.

They operated until 1868, when Wm. Huston leased the mine and operated until 1877.

The property then passed into possession of Robert Arthurs and Alexander Bradley of Pittsburgh, the present owners, who in 1878 leased it to Jordon S. Neel, who built a new abutment tipple and some additional houses, and made other extensive improvements in the mine.

During the first three years Mr. Neel operated in the northern part of the property. He mined out here an area of thirty acres as determined by actual survey, which produced 3,000,000 bushels of lump coal, as shown by the books at the end of that time.

He was forced to abandon this part of the mine soon after that time by reason of a *crush* or squeeze in the roof and pillars which closed the entries and rendered access difficult and dangerous to life. Large quantities of *fire-damp* (carburetted hydrogen) were flowing from the roof coal at the head of the workings, which also added to the danger of continuing operations at this point.

He then re-opened the old workings in the southern part of the property, which so far has been attended with much better results, and this part of the mine now appears to be in good working condition. It is operated on the double-entry system, and the coal is run to the river trade. Ventilation is produced by furnace power.

Area mined out 175 acres.

Bottom of coal $27\frac{1}{2}$ feet above low water. 125 miners, 8 drivers and 4 day men are employed.

Daily output 8500 bushels of lump coal.

86. BRITTON MINE, (28 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1839 by Thomas Smith on the line between his property and that of Andrew Kirkendall. He operated in a small way for a few years and ran the coal to the river trade.

After remaining idle for many years it came into possession of John Britton, who sold it to John Dippold, December 31, 1866; and at present it is included in the *New Cincinnati mine*

87. MCKINNEY MINE, (28 miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1846 by Hugh McKinney and operated by him until 1849. He sold the property to John Dippold, February 9, 1872. One acre was mined out and the property is now included in the *New Cincinnati mine*

88. JESSE BENTLY MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1835 by Jesse Bently and operated by him in a small way until 1850. The coal was wheeled out of the mine by hand-barrows and carts, stocked on the river bank, and loaded into boats, according to the custom of that day. The property is now included in the *New Cincinnati mine*.

89. OLD CINCINNATI MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1851 by Capt. Wm. Ferree for the Cincinnati Coal Company, who operated here until 1854 and opened the New Cincinnati mine. The coal was run to the river trade, and the property is now included in the *New Cincinnati mine*.

90. WILLIAM FINLEY MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1838 by William Finley and operated by him until 1848, in a small way. The coal was run out of the

mine by hand-barrows and carts, and loaded into boats, under the system of first stocking it on the river bank until a rise of water would come.

The property now belongs to the *New Cincinnati mine*.

The bottom of coal at pit mouth 45 $\frac{3}{8}$ feet above pool water, and 15 feet above railroad grade.

91. PORT FINLEY MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1833 by Levi Finley, who loaded 12 boats of coal during that year. The coal was run to Louisville by river, and sold in that market.

The property afterwards passed into possession of Mrs. Neel, who leased the mine to various persons that operated in a small way.

It now belongs to Thomas Hutchinson.

Area mined out nearly an acre.

Bottom of coal 40 $\frac{1}{8}$ feet above pool water, and 11 feet above railroad grade.

92. H. H. FINLEY MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1833 by H. H. Finley, under lease from his grandfather John Finley, the owner, and was operated by H. H. Finley until 1835. The property now belongs to John Dewar.

93. JOHN FINLEY MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1830 by John Finley to supply fuel to a steam saw and grist mill, which he built at that place during the same year. The mine was run in connection with the mill successively by Levi Finley, William Cochran, Dr. Joseph Curry and H. H. Finley, until 1842, when the mill was destroyed by fire.

During that year H. H. Finley built a coal road to the river, and loaded four *French creek* boats under contract with John Leady. Leady furnished the empty boats on agreement that he was to have two of them when loaded, and Finley was to have the other two. Finley informs me that he sent his two boats to market in care of John Donly, in the month of May of that year; one of which was lost on the way, and the other passed through safely to Cincinnati. The coal was sold during the month of August at five cents per bushel. The boats held about 6000 bushels each. He paid $1\frac{1}{2}$ cents per bushel for the coal mined and delivered at the pit mouth.

The property now belongs to James Craig.

94. CHESTER MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Owned and opened up by Samuel Chester in 1846, and operated by him in a small way until 1862. The price paid for the coal mined and delivered at the pit mouth was $1\frac{1}{2}$ cents per bushel, and day laborers 75 cents per day.

The property now belongs to Isaac Dawson.

95. COX MINE, (27 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

Owned and opened up by Enoch Cox in 1830, who operated in a small way and ran coal to the river trade until 1840.

The property now belongs to Captain James May.

96. HUGHES MINE, (27 $\frac{2}{3}$ miles from Pittsburgh.)

Situated on the east side of the river.

Opened in 1840 by John Hughes, who ran coal to the river trade and operated for a few years. The coal was transported from the mine in barrows and hand-carts, and stocked on the river bank, ready to be loaded into boats at the first favorable stage of the water.

The property now belongs to Aaron Conlin.

97. CRAIG MINE, (27½ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1874 by James, Robert, and Hugh Craig, who built a road and railroad tipple and ran the product of the mine by rail to the Pittsburgh market.

It has not been in operation since 1879.

Area mined out four acres.

Bottom of coal at pit mouth 39½ feet above low water, and 16 feet above the railroad.

A pit was opened near the upper line of this property in 1831 by F. Rhodes, who operated in a small way for a few years only and sold the property to James Craig.

98. JENKINS MINE, (27½ miles from Pittsburgh.)

Situated on the west side of the river.

Owned and opened up in 1830 by John Jenkins, who operated and run coal to the river trade until 1837. The first four boats that he loaded were sunk before they arrived at market, but the next boat load was sold for 20 cents per bushel at Cincinnati.

Area mined out four acres.

The property now belongs to William M. Lyon & Company of Pittsburgh.

99. FRENCH MINE, (27⅞ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1830 by Samuel French, who operated until, in 1840, he was killed on board of a loaded coal boat near the foot of Muskingum Island on the Ohio river. They were trying to land the boat and had one end of a line tied to shore and the other end was being coiled around a check-post of the boat. The current was quite rapid and he was caught between a coil of the rope and the check-post. While in this position the post was pulled out and French was carried into the river. The boat then floated down stream and sunk a short distance below.

7 K'.

The crew returned and pulled French out of the water and found him dead.

His sons James, Rufus, Westley, and Benjamin French operated the mine for several years after that time.

Area mined out two acres.

100. HUTCHISON MINE, (27½ miles from Pittsburgh.)

Situated on the west side of the river.

Opened about 1835 and operated in a small way by various persons until 1852, when it passed into possession of Robert and William White, who operated until 1861.

Then it was operated under lease by Milo and George Gibson until 1868, and since that time it has remained idle.

The coal was run to the river trade.

Area mined out about two acres.

The property is now owned by Thomas Hutchison.

On the lot adjoining the north side of the above-mentioned Hutchison property there was a pit opened by a Mr. Dewis in 1825. He used the product of the mine in burning lime for a number of years. The property now belongs to Capt. James May

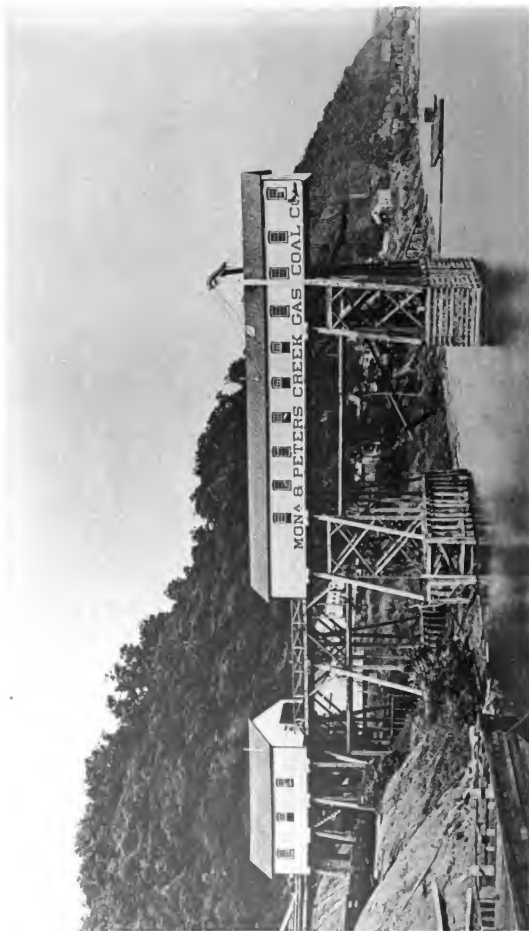
101. NEW COAL BLUFF MINE, (27½ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1840 by M. Correy and R. Black, who built a slide tippie and operated until 1849 and sold it to Absalom Bentley, from which time it remained idle until 1862, when it was sold to James Verner, who became a member of the *Coal Bluff Coal Company* in 1864 and conveyed this property to the company at that time.

During that year they built a new road and tippie and run coal to the river trade until 1872.

In 1875 the company dissolved and the entire property was sold to George Logan and J. B. Finley, who, in 1877, leased the mine to John D. Negley, who sub-leased it to R.



100108

NEW COAL BLUFF TIPPLE.

MON & PETERS CREEK CO.

T. Patterson and D. Steen & Son, who operated until May, 1882, and it remained idle until October, 1882.

J. B. Finley sold his interest to George Logan in June, 1878, and in 1882 Logan sold the entire property to J. B. Finley, who in turn sold it during October of the same year to the *Monongahela and Peters Creek Coal Company*, consisting of Allen Kirkpatrick, W. K. Gillespie, Alexander Dempster, A. M. Scott and Evan Beedle.

This company have made large improvements both inside and outside of the mine. During the last year they built a new road, a railroad, and a river tippie, and are prepared to run coal on an extensive scale by both river and rail.

The mine is worked on the double-entry system, and ventilated by furnace power. The furnace is 16 feet in length, arched with brick, with a fire lining of fire-brick. The fire bed is 8 feet long and $6\frac{1}{2}$ feet wide. The grate bars are 2 feet above the furnace floor and 4 feet 8 inches below the under side of the arch.

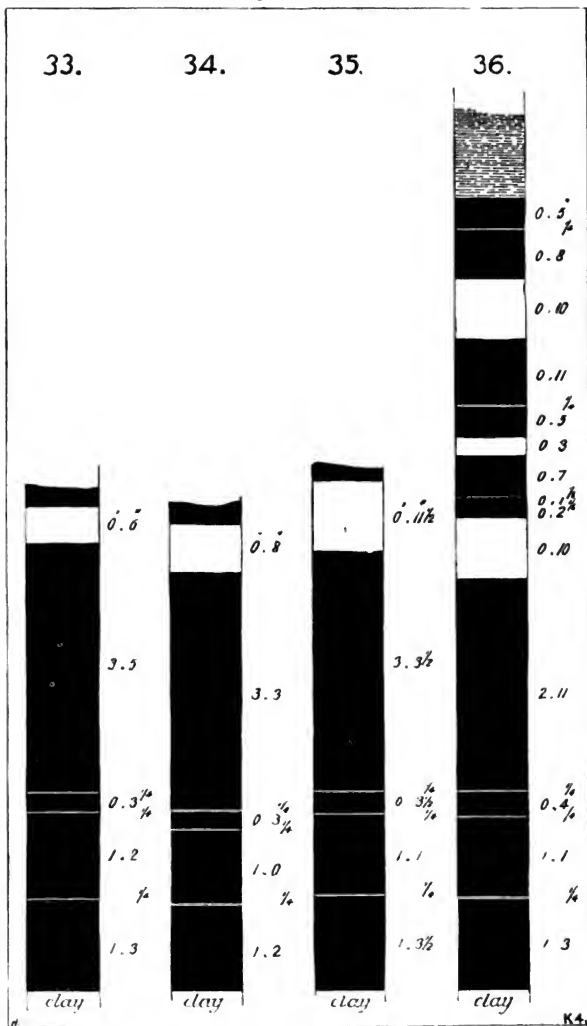
The shaft and stack are 22 feet from the rear end of the furnace, 50 feet in height, and circular in form, 8 feet in diameter. The fresh air enters the mine through another shaft, 47 feet in depth, and located on No. 2 butt entry.

The head of the present workings is nearly one mile from the pit mouth. The main hauling roads are laid with "T" iron rails. The main entry and air course are driven parallel with each other, approximately N. 20° W., with 40 feet of solid coal remaining between them. They rise about 66 feet from the pit mouth to the mouth of No. 20 butt entry, a distance of 1720 yards, and are still rising so far as driven.

A *swamp* enters this mine at the north side from the *Cliff mine*, on a bearing of about S. 65 W. and passes through the head of the old workings, where it curves to the north-west and pursues a direction approximately parallel with the main entry.

It crosses butt entry No. 16 at 520 yards from the main entry, and is 25 feet in depth at that point.

The roof members are much disturbed by small *horse-*



backs in some parts of the mine. This condition gives a very rough and uneven roof.

The *over-clay* measures from 6 to 10 inches where it is not affected by swells or horse-backs.

Clay veins and *spars* are quite numerous, but are not so large as to cause any serious inconvenience in mining.

There are a few *rolls in the roof member* that cut out almost all of the over-clay for short distances.

Near the mouth of butt entry No. 17 I found the *lower coal* members to measure :

	Roof coal.	
New Coal Bluff mine Section No. 1. (Fig. 33.)	{	Over-clay, 0' 6"
		Breast coal, 3 5
		Parting, 0 ¼
		Bearing-in coal, 0 3
		Parting, 0 ¼
		Brick coal, 1 2
		Parting, 0 ¼
		Bottom coal, 1 3

Under clay.

Near the head of the same entry I found the *lower members* to measure :

	Roof coal.	
New Coal Bluff mine Section No. 2. (Fig. 34.)	{	Over clay, 0' 8 "
		Breast coal, 3 3
		Parting, 0 ¼
		Bearing-in coal, 0 3
		Parting, 0 ¼
		Brick coal, 1 0
		Parting, 0 ¼
		Bottom coal, 1 2

Under-clay.

At the bottom of the *swamp* I found the *lower members* to measure :

	Roof coal.	
New Coal Bluff mine Section No. 3. (Fig. 35.)	{	Over-clay, 0' 10' to 1' 1'
		Breast coal, 3 2 to 3 5
		Parting, 0 ¼
		Bearing-in coal, 0 3½
		Parting, 0 ¼
		Brick coal, 1 1
		Parting, 0 ¼
		Bottom coal, 1 3 to 1 4

Under-clay.

These members are found to vary in thickness in different parts of the swamp, as well as in other parts of the mine.

On the Elliott entry, now called butt entry No. 1, I found the following section of all the coal members to be:

Carbonaceous shale.	
<i>New Coal Bluff mine</i> <i>(butt entry No. 1)</i> <i>Section No. 4.</i> <i>(Fig. 36.)</i>	Block slate, 3' 0"
	Coal, 0 5
	Parting, 0 ½
	Coal, 0 8
	Clay, 0 10
	Coal, 0 11
	Parting, 0 ½
	Coal, 0 5
	Clay, 0 3
	Coal, 0 7
	Parting, 0 ½
	Coal, 0 1
	Parting, 0 ½
	Coal, 0 2
	<i>Over-clay</i> , 0 10
	Breast coal, 2 11
	Parting, 0 ½
	Bearing-in coal, 0 4
Parting, 0 ½	
Brick coal, 1 1	
Parting, 0 ½	
Bottom coal, 1 3	
Under-clay.	

Cleavage planes were seen to bear:

N. 64½ W. 8 feet	—	N. 61½ W. 8 feet.
N. 59½ W. 8 "	—	N. 64½ W. 6 "
N. 65 W. 5 "	—	N. 65½ W. 4 "
N. 65½ W. 4 "	—	N. 63½ W. 6 "
N. 59 W. 7 "	—	N. 61½ W. 6 "
N. 64½ W. 12 "	—	N. 64½ W. 3 "

The coal is transported from the workings to the tippie by mule power. They are only driving entries at present.

This mine includes the coal remaining in the *Reed*, *Kennedy* and *Coal Bluff No. 1, 2 and 3 mines*.

Total area mined out of all of these mines amounts to 300 acres, and a much larger area remains unmined.

Bottom of coal at pit mouth 51½ feet above pool water, and 26 feet above railroad grade.

102. REED MINE, (27½ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1830 by Paul Reed, and operated by him until 1840. Four acres were mined out, and the coal was run to the river trade. The property is now included in the New Coal Bluff property.

103. PETERSON MINE, (27 miles from Pittsburgh.)

Located on the west side of the river.

Owned and opened up in 1836 by Dr. Robert Wray, who operated by river, and sold the property in 1847 to Herron, Peterson and Kain.

The mine remained idle until 1850 and was leased to Thomas Wilson and Thomas Woods, who operated until 1852.

Herron, Peterson and Kain then operated it until 1860.

In 1862 it was sold to James Verner, who in 1864 became a member of the *Coal Bluff Coal Company* and conveyed this property to that company. The property is now included in the *New Coal Bluff Mine*. The Coal Bluff Station is immediately in front of the old pit mouth.

104. COAL BLUFF MINE No. 3, (26½ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1858 by James K. Logan and Franklin Dorman, who built a tramroad and slide tipple, and operated until 1864. The coal of this mine was run to the river trade, and the property is now included in the *New Coal Bluff mine*.

105. COAL BLUFF MINE No. 2, (26½ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1852 by James K. Logan and Franklin Dorman, who built a tramroad and slide tipple during 1853, and operated until 1858. The coal was run to the river trade and the property is now included in the *New Coal Bluff mine*.

106. COAL BLUFF MINE No. 1, (26½ miles from Pittsburgh.)

Situated on the west side of the river.

Opened in 1840 by Benjamin and Jesse Bently and operated by them until 1843, when it was sold to Samuel and Jacob Balsley.

They operated until the autumn of 1847, and sold it to James K. Logan and Franklin Dorman.

They operated together until Dorman sold his interest to Logan in 1857; and Logan continued to operate until 1864.

Then he organized the *Coal Bluff Coal Company*, composed of James K. Logan, James Verner, Alexander Speer, Nathaniel Holmes, John T. Logan, Edward Gregg, James Hudson, John Hall and others.

The coal was run to the river trade, and the property is now included in the *New Coal Bluff mine*.

107. CLIFF MINE, (26½ miles from Pittsburgh.)

Situated on the west side of the river.

Opened up in 1838 by John Jenkins, who within the previous year had bought the property, consisting of 84 acres of coal and 15 acres of surface frontage connected therewith, from William Hindman for \$700.

The coal was wheeled out of the mine in hand-carts and barrows and dumped into a chute holding about 800 bushels until it was full, then the balance was thrown into a stock-yard at the down-river side of the chute.

The *chute* was 25 feet wide at the upper end, 9 feet wide at the lower end and 50 feet in length. It was set at such an inclination that when the door or gate was raised at the lower end the coal would run out on to a screen that formed a continuation of the chute, and from thence the lump coal passed into tram-wagons that conveyed it down an incline tram-road to the boats at the river. There were two of these wagons connected by a rope that passed over a small drum or check-wheel placed under the lower end of the chute proper. The force of a full wagon in going down the tramway pulled the empty one back up under the screen ready for refilling again. When the coal contained in the

chute become exhausted, resort was then had to the stock-yard for a convenient supply. In which case the coal was wheeled in barrows and dumped on to the upper end of the screen, from whence it passed into the tram-wagons and down the incline to the boats at the river in the same way as from the chute.

This comprised a slight improvement on the *stocking system* of that period. By the stocking system the coal could be mined and stored in a convenient place for loading into boats, independent of the stage or condition of the water. When the river commenced to rise they would begin to load the boats and prepare for a trip down the river to market. At many places in this vicinity, however, there were pools deep enough to load boats at an ordinary stage of the river, by which means some of the operators were able to have a number of boats in readiness for a rise of water, without the use of the stock-yard.

This was prior to the *slack-water improvement*, and at a time when all heavy freitage in large bulk from this region was entirely dependent upon the quantity of running water in the river.

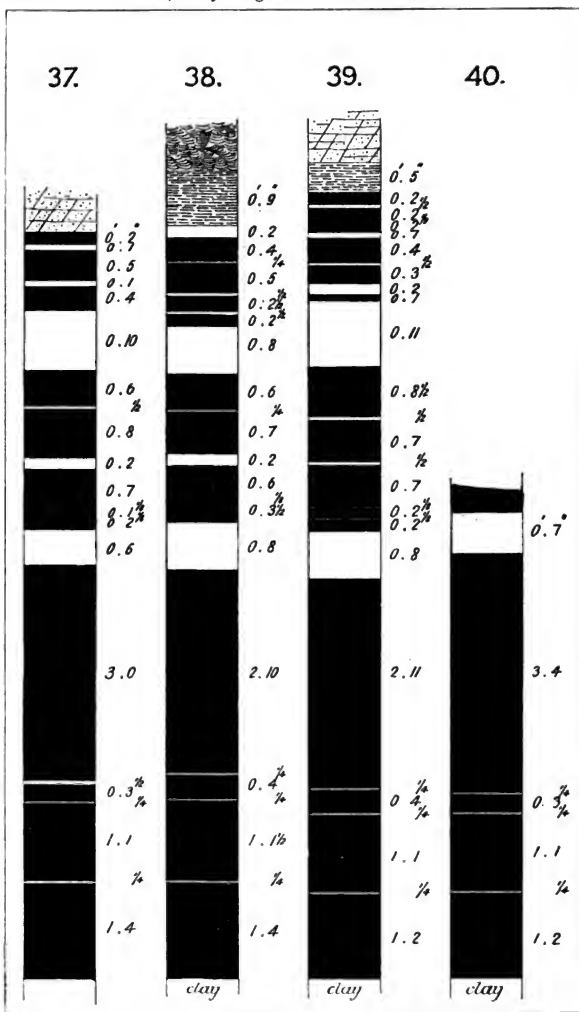
John Jenkins operated this mine until 1863 and sold it for \$13,500 to Shesh Kennedy, who built a new road, an abutment tipple, and operated by river until 1870.

Then he sold to George T. Miller, Robert Greenarch, and Daniel Kane, who operated until 1876 and leased it to Samuel Sculley.

Sculley operated until 1883 when Harvey Hutchinson leased the mine and continues as operator.

It is worked on the double-entry system. The main entry and air course are driven nearly due north from the pit mouth for a distance of 1867 yards, and from thence they bear N. 27 W. 480 yards to the head of the workings. The butt entries are driven in pairs from the right and left of the main entry.

A *swamp* 18 feet in depth and 200 yards wide crosses through the mine on a bearing of N. 65° E. It crosses the main entry and air course at 867 yards from the pit mouth, and is the same that is found in the Banner mine on the



east, and the New Coal Bluff mine on the south side. The roof coal members, where the main entry crosses the swamp, have been blasted down, and the floor of the entry brought up to grade. This entry has a gradual rise now from the pit mouth to the head. This rise amounts to $41\frac{1}{8}$ feet at the distance of 1563 yards from the pit mouth or entry No. 19.

The coal wagons are collected from the working places to a point on the main entry one mile from the pit mouth, and from there they are hauled out to the tipple house by means of a $\frac{3}{4}$ inch wire line, operated by a drum and stationary engine located near the pit mouth, and worked on the tail-rope system. The rope travels over a metal bull wheel in the entry. The empty cars are returned by the same means.

Ventilation is produced by means of a furnace and shaft located near the right hand side of the main entry and air course, and one mile from the pit mouth. The furnace is $12\frac{1}{2}$ feet long, 7 feet 8 inches wide, and 6 feet 9 inches high under top of arch. The grate bars are placed $2\frac{1}{2}$ feet from the floor, and the fire bed is $8\frac{1}{2}$ feet in length. The furnace rises one foot from front to back. The shaft is even with back of furnace. It is circular in form, $7\frac{1}{2}$ feet in diameter, 110 in height through rock and shale, and is surmounted by a wooden stack 30 feet high. The air enters the mine at the pit mouth and travels around through the workings to the furnace, a distance of 4340 yards. I found the quantity of air passing through the furnace to be 33,250 cubic feet per minute, and by using fresh air direct from the main entry at a point 1760 yards from the pit mouth, I found the quantity then passing through the furnace to be increased to 43,750 cubic feet per minute. This shows a loss of about 25 per cent in the effective power of the furnace by the air having to travel the additional distance of 2580 yards around through the working places of the mine before it reaches the furnace.

The sandstone is found resting immediately on the upper member of the roof coal, for a distance of 600 yards along this entry. It is light gray in color, micaceous, and very hard.

The following columnar section was obtained on butt entry No. 23 :

Light gray micaceous sandstone.

<i>Cliff mine Section</i> <i>No. 1.</i> <i>(Fig. 37.)</i>	{	Coal,	0' 2"	
		Clay slate,	0 1	
		Coal,	0 5	
		Clay slate,	0 1	
		Coal,	0 4	
		Clay,	0 10	
		Coal,	0 6	
		Slate parting,	0 ½	
		Coal,	0 8	
		Clay,	0 1	to 3"
		Coal,	0 7	
		Parting,	0 ¼	
		Coal,	0 1	
		Parting,	0 ¼	
		Coal,	0 2	
		<i>Over-clay</i> ,	0 6	
		Breast coal,	3 0	
		Parting,	0 ½	
Bearing-in coal,	0 3			
Parting,	0 ¼			
Brick coal,	1 1			
Parting,	0 ¼			
Bottom coal,	1 4			

Sandstone, micaceous.

	Carbonaceous shale,	10' 0"		
	Block slate,	0 9		
	Clay slate,	0 2		
<i>Cliff mine Section</i> <i>No. 2. (Fig. 38.)</i>	{	Coal,	0 4	
		Parting,	0 ¼	
		Coal,	0 5	
		Parting,	0 ¼	
		Coal,	0 2½	
		Slate parting,	0 ¼	
		Coal,	0 2	
		Clay,	0 8	
		Coal,	0 6	
		Slate parting,	0 ¼	
		Coal,	0 7	
		Clay,	0 ¼	to 4'
		Coal,	0 6	
		Parting,	0 ½	
		Coal,	0 3½	
		<i>Over-clay</i> ,	0 8	
		Breast coal,	2 10	
		Parting,	0 ¼	
Bearing-in coal,	0 4			
Parting,	0 ¼			
Brick coal,	1 1½			
Parting,	0 ¼			
Bottom coal,	1 4			

Under-clay.

At a point where the main entry crosses the swamp all of the coal members are well exposed to view, and I obtained the foregoing section.

The following columnar section was obtained at the pit mouth :

	Sandstone.	
	Block slate,	. . . . . 0' 5"
Cliff mine Section No. 3. (Fig. 39.)	{	Coal, 0 2
		Slate, 0 ½
		Coal, 0 2
		Parting, 0 ½
		Coal, 0 2
		Slate, 0 1
		Coal, 0 4
		Slate, 0 ½
		Coal, 0 3
		Clay slate, 0 2
		Coal, 0 1
		Clay, 0 11
		Coal, 0 8½
		Parting, 0 ½
		Coal, 0 7
		Parting, 0 ½
		Coal, 0 7
		Parting, 0 ½
		Coal, 0 2
		Parting, 0 ½
		Coal, 0 2
		Over-clay, 0 8
		Breast coal, 2 11
Parting, 0 ½		
Bearing-in coal, 0 4		
Parting, 0 ½		
Brick coal, 1 1		
Parting, 0 ½		
Bottom coal, 1 2		
	Under-clay.	

Both the *over-clay* and the roof coal clay are found to vary from 0 to 10 inches in thickness, and both of them are affected, in some parts of the mine, by swells or horse-backs.

Horse-backs are found in the main over-clay, measuring from 2 to 10 feet in length, and from 15 to 30 inches in thickness.

Clay veins and *spars* are quite rare; only five are reported for the whole mine. I find the disturbed condition of the roof members repeated here, in a modified form, that

exist at the Iron City and Columbia mine near the head of this pool, and at the Rostraver mine above Dam No. 4.

Cleavage planes :

N. 63 $\frac{1}{4}$ W. feet.—N. 63 $\frac{1}{4}$ W. 4 feet. .

N. 66 $\frac{1}{4}$ W. " —N. 65 W. 5 "

They are prepared to ship coal by both river and rail.

Floor of river tipple 46 feet above low water.

Floor of railroad tipple 24 feet above railroad grade.

Bottom of coal at pit mouth, 73 feet above pool water.

They employ 125 miners, 5 drivers and 12 day men, and the output averages 8000 bushels of lump coal per day. The entire product yields 60 per cent. of lump, 20 per cent. nut and 20 per cent. dust coal.

Total area mined out to this time, 240 acres.

108. IRWIN MINE, (26 $\frac{1}{2}$ miles from Pittsburgh.)

Located on the east side of the river.

Opened in 1845 by Coon and Fanestock, who operated until 1849; and it remained idle until 1850, when it was sold to Aughenbaugh and Moore.

They operated until 1855, and leased it to Patrick Manly and John McCleese, who operated until 1856, when it was sold to I. C. Irwin, the present owner, and has not been in operation since that time.

The coal was run to the river trade.

Area mined out, about 20 acres.

109. ABSALOM BENTLY MINE, (26 $\frac{2}{3}$ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1830 by Absalom Bentley, who built an incline tramway and slide tipple, and operated until 1834, when he sold the property to William Ferree.

It was then operated by Wm. Ferree until 1850; and the mine is now included in the *Coal Bluff* property.

The coal was run to the river trade.

Area mined out, twenty acres.

The surface land belongs to the heirs of Samuel French, deceased.

110. BANNER MINE No. 1, (26½ miles from Pittsburgh.)

Located on the west side of the river. Owned by James H. Gamble and John M. Risher, and was opened up by them in 1879. They built an abutment tippie and run coal at this place by river.

This mine is operated on the double-entry system, and in connection with *Banner mine No. 2*. The cars are run on an incline tramway from the pit mouth to the tippie at the river, a distance of 400 yards. The main entry is driven single through the front hill to the outcrop, on a small ravine a distance of 400 yards from the front pit mouth. The road then crosses the ravine, and the coal at the second hill is entered by two entries, driven parallel with each other to the head of the workings.

The main entry rises 27 feet in 900 yards from the opening at the ravine, then dips 27 feet in 50 yards to bottom of *swamp*, and runs level for about 20 yards in bottom of swamp to its head.

This *swamp* passes through the head of the present workings from the north side, and is the same that enters the *Cliff mine* on the south side.

The mine is ventilated by a furnace located near the left side of the left hand main entry, and near the front of the second hill. The furnace is 25 feet long, 7 feet wide and 7 feet high, from the floor to under side of top of arch. The grate bars are placed 2 feet above the floor. The shaft is even with back end of furnace, circular in form, 8 feet in diameter, 85 feet in height through rock and shale, and surmounted with a wooden stack 8 feet square and 30 feet high. I found the quantity of air passing through the furnace to be 23,861 cubic feet per minute (as indicated by the anemometer) after traveling from the inlet and around the various air ways, a total distance of 4575 yards; and by making a direct connection with the outside atmosphere, by

means of a door near the furnace, I found the quantity increased to 42,385 cubic feet per minute.

The following section of the lower coal members was obtained at bottom of the swamp:

	Coal.	
<i>Banner mine No. 1</i> <i>Section No. 1.</i> (<i>Fig. 40.</i>)	Over-clay,	0' 6" to 8
	Breast coal,	3 4
	Parting,	0 ½
	Bearing-in coal,	0 3
	Parting,	0 ½
	Brick coal,	1 1
	Parting,	0 ½
	Bottom coal,	1 2
	Under-clay.	

At a point on the margin of the swamp the lower members give the following section:

	Coal.	
<i>Banner mine No. 1.</i> <i>Section No. 2.</i> (<i>Fig. 41.</i>)	Over-clay,	0 9"
	Breast coal,	2 10
	Parting,	0 ½
	Bearing-in coal,	0 3
	Parting,	0 ½
	Brick coal,	1 0
	Parting,	0 ½
	Bottom coal,	1 3
	Under-clay.	

Clearage planes bear:

N. 61° W. 6 feet—	N. 63¼ W. 6 feet.
N. 59½ W. 3 " —	N. 66¼ W. 10 "
N. 63½ W. 6 " —	N. 65 W. 8 "
N. 63 W. 5 " —	N. 64 W. 4 "
N. 65½ W. 10 "	

Bottom of coal at pit mouth 90 feet above pool water.

III. BANNER MINE NO. 2, (2¼ miles from Pittsburgh.)

Located about ¼ of a mile north of *Banner Mine No. 1*. Owned by James H. Gamble and John M. Risher, and operated by them in connection with *Banner Mine No. 1*. They built a tramroad, elevator, and tippie at this place in 1879, and run coal by rail.

The pit cars are run on a level tramroad from the pit mouth to the top of the elevator, a height of 84 feet above

railroad grade, from whence they are lowered by cages to the tipple floor below, where the coal is screened into railroad cars, after which they are returned to the tramroad above by the same means.

They employ at both mines 150 miners, 8 drivers and 8 day men, and the output amounts to 9000 bushels of lump coal per day.

Total area mined out at both places, sixty acres.

Bottom of coal at pit mouth 102 feet above pool water.

112. McKNIGHT MINE, (26½ miles from Pittsburgh.)

Located on the east side of the river.

Owned and opened up in 1852 by Rufus, Wesley, Benjamin, and William French, who built an incline road and an abutment tipple, and operated until 1861.

The property was then sold to George Bentley, who sold it to Dean and McKnight in 1863. They changed the old tipple to a slide tipple, and operated until 1868.

It remained idle until 1872, when it was sold to Nicholas and William O'Neel, who are the present owners.

The coal was run to the river trade.

Area mined out amounts to fifty acres

(112a. PARK MINE, 25½ miles from Pittsburgh.)

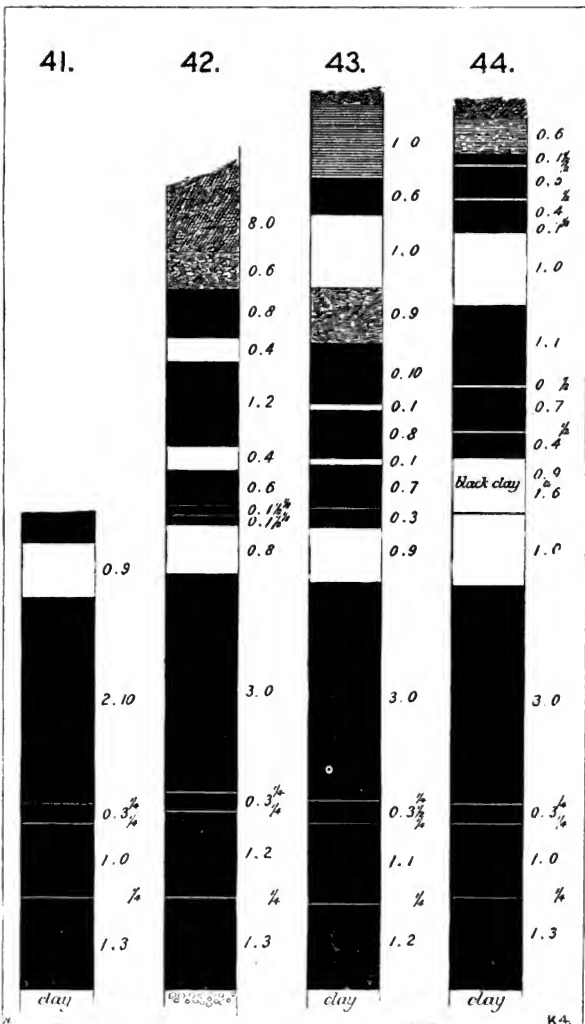
Located on the east side of the river.

Owned and opened up in 1850 by Judge Park, who built an incline road, tipple, and made other improvements, and operated only about one year. The coal was run to the river trade, and the property now belongs to Judge Park's heirs.

113. WENONA MINE, (25½ miles from Pittsburgh.)

Situated on the east side of the river.

Owned and opened up in 1842 by Andrew Leech and Thomas Smith, who built a shute, incline tramway, and a slide tipple. The coal was transported from the workings 8 K'.



to the pit mouth in hand-carts until 1845, when they commenced to use the regular coal wagon of the present style, hauled out by mules.

They run the coal by river to the St. Louis market during the year of 1850, in *moddle barges* holding from 12,000 to 14,000 bushels each. They owned eight of these barges, and about 20 *flat* boats, holding 1200 bushels each.

They also owned the tow-boat *Active*. She was a stern-wheel boat, something like the form of such boats at the present time. Tow-boats at that day were used for carrying passengers and freight, as well as for towing coal.

They also built and owned the tow-boat *Dispatch*. She was also a stern-wheel boat. While this boat was making a trip from the mine to Pittsburgh, during the summer of 1847, one of her boilers burst and killed the pilot, Lewis Pearse, and two other men, and damaged the boat to a considerable extent; John Nelson was captain. The accident occurred near the Collins tipple about one mile below the mouth of the Youghiogheny river. The boat was afterwards repaired and continued to run in the trade.

They operated until 1864 and sold to H. H. Collins and Thomas Smith; who operated until 1866, and leased it to Abraham Nish and Brothers.

They operated for several years, and the property passed into possession of Benjamin Collins and Mr. Wright, the present owners, April 26, 1878.

They leased the mine during that year to James Skillen and Brothers, who are the present operators.

They employ 25 miners. 3 drivers and 4 day men, and produce 2000 bushels of lump coal per day.

Bottom of coal at pit mouth, 138 feet above low water.

Area mined out, 90 acres.

114. LOCUST GROVE MINE, (25 miles from Pittsburgh.)

Situated on the east side of the river.

Opened in 1843 by William Alexander, who operated until 1846.

He then leased it to Archibald McLease and Hugh Killen, who operated until 1874.

It was then operated until 1848 by John and James Naulder; who sold their lease to Black and Lindsay; who operated until 1849; since when the mine has remained idle.

Area mined out, 5 acres.

Coal transported by river.

115. HILLDALE MINE, (25½ miles from Pittsburgh.)

Located on the west side of the river.

Owned by William Hodgson, and was opened in 1871 by William Hodgson and James Mort, who built an abutment tippie at the river, and an incline tramway from there to the pit mouth, a distance of 1360 yards.

They operated until 1876, when it was leased to James Mort and Robert Blackburn.

They operated until February, 1881, and it was leased to D. H. Linch, Cyrus Robison, Joseph Stone, and George Stone.

They operated until 1883, when Joseph and George Stone sold their interest to Frederick Wilson. Linch, Robison, and Wilson continue to operate the mine.

It is worked on the single-entry system and ventilated by furnace power. The air enters the east side of the mine, through a shaft opening, passes around the head of the workings until it reaches the furnace at the west side.

The pit wagons are hauled to the pit mouth by mules, and from there they are run down the incline plane in trains, by means of a stationary engine, wire line, and force of gravity to the tippie at the river, and empty ones are returned by means of the same engine and line. The engine is stationed near the pit mouth.

The coal is run to the river trade.

Area mined out 106 acres, including several acres that are reported as lost by reason of fallen roof.

They employ 130 miners, 5 drivers, and 7 day men, and the output amounts to 9000 bushels of lump coal per day.

The following columnar section was obtained at the pit mouth :

	Sandstone.	
	Carbonaceous shalo,	8' 0"
	Shale with nodules of iron ore,	0 6
<i>Hilldale mine</i> <i>Section.</i> <i>(Fig. 42.)</i>	{ Coal,	0 8
	{ Clay,	0 4
	{ Coal,	1 2
	{ Clay,	0 4
	{ Coal,	0 6
	{ Parting,	0 1
	{ Coal,	0 1½
	{ Parting,	0 1
	{ Coal,	0 1½
	{ Over-clay,	0 8
	{ Breast coal,	3 0
	{ Parting,	0 1
	{ Bearing-in coal,	0 3
	{ Parting,	0 1
	{ Brick coal,	1 2
	{ Parting,	0 1
{ Bottom coal,	1 3	
	Under-clay with calcareous nodules.	

Cleavage planes observed :

N. 63 W. 8 feet—N. 65 W. 9 feet.

N. 61½ W. 6 " —N. 63 W. 7 "

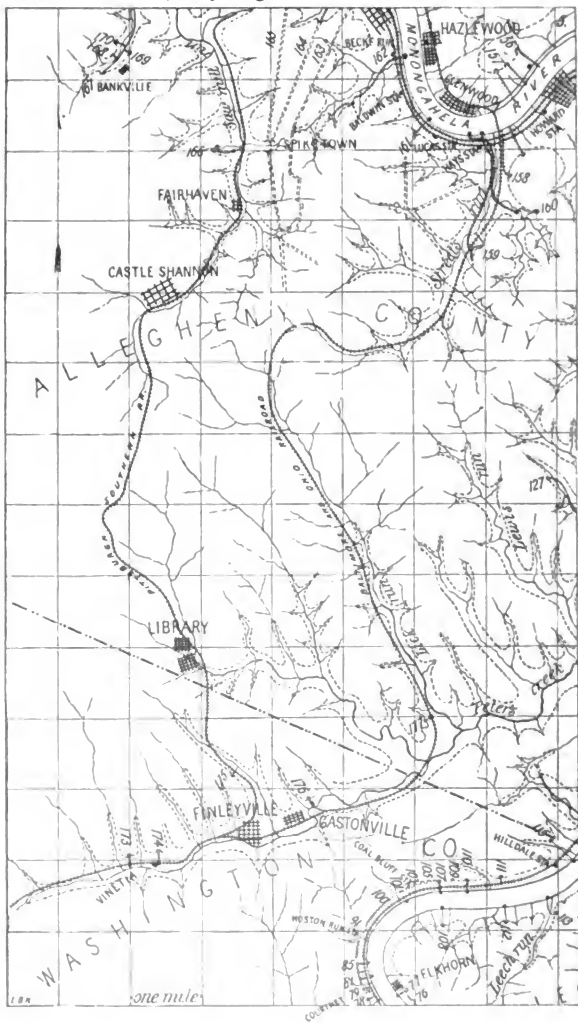
N. 61¼ W. 4 " —N. 63¾ W. 6 "

N. 63 W. 7 " —N. 64 W. 5 "

N. 63½ W. 6 " —N. 60 W. 4 "

Bottom of coal at pit mouth 150.35 feet above pool water by accurate leveling, and 124.70 above railroad grade.

Tipple floor 32½ feet above pool water.



CHAPTER VI.

Mines located in Pool No. 2.

116. UPPER WALTON MINE, (24 $\frac{1}{10}$ miles from Pittsburgh.)

Situated on the west side of the river.

It is owned and operated by Hon. Joseph Walton, and was opened by him in 1872. This mine is worked on the block or single entry system.

The main entry is driven on a bearing of about N. 20° W. out to the crop on Peters' Creek. An air course is driven parallel with the main entry with a pillar of forty feet of coal remaining between them. Butt entry No. 5 of this mine connects with, and forms a continuation of the main butt entry or *dilly* road of the *Lower* mine.

The pit cars are hauled by mules from the present workings in the second hill to, and through the old workings of the first or front hill to the check house, a distance of one mile, and from that point they pass down a gravity plane of about 100 yards to the base of the hill, from where they are hauled in trains of 23 cars each by a *steam locomotive* over a graded road one mile in length, laid with T iron rails, to the tipple house at the river.

The mine is ventilated by natural means, which is due to the favorable position of the crop line on both sides of the mine, enabling nearly all of the entries to reach that line before the air becomes too impure for working in it. The mine is well drained and in excellent working condition.

A *swamp*, sixteen feet in depth and 300 feet in width, passes through the eastern part of the mine on a bearing approximately N. 60° E.

The following columnar section was obtained :

	Carbonaceous shale,																					
	Block slate,	1'	0''																			
Upper Walton mine Section. (Fig. 45.)	<table border="0"> <tr><td>Coal,</td><td rowspan="15">}</td></tr> <tr><td>Clay,</td></tr> <tr><td>Carbonaceous shale, . .</td></tr> <tr><td>Coal,</td></tr> <tr><td>Clay parting,</td></tr> <tr><td>Coal,</td></tr> <tr><td>Clay parting,</td></tr> <tr><td>Coal,</td></tr> <tr><td>Parting,</td></tr> <tr><td>Coal,</td></tr> <tr><td>Over-clay,</td></tr> <tr><td>Breast coal,</td></tr> <tr><td>Parting,</td></tr> <tr><td>Bearing-in coal,</td></tr> <tr><td>Parting,</td></tr> <tr><td>Brick coal,</td></tr> <tr><td>Parting,</td></tr> <tr><td>Bottom coal,</td></tr> </table>	Coal,	}	Clay,	Carbonaceous shale, . .	Coal,	Clay parting,	Coal,	Clay parting,	Coal,	Parting,	Coal,	Over-clay,	Breast coal,	Parting,	Bearing-in coal,	Parting,	Brick coal,	Parting,	Bottom coal,		
		Coal,		}																		
		Clay,																				
		Carbonaceous shale, . .																				
		Coal,																				
		Clay parting,																				
		Coal,																				
		Clay parting,																				
		Coal,																				
		Parting,																				
		Coal,																				
		Over-clay,																				
		Breast coal,																				
		Parting,																				
		Bearing-in coal,																				
Parting,																						
Brick coal,																						
Parting,																						
Bottom coal,																						
			0 6																			
			1 0																			
			0 9																			
			0 10																			
			0 1																			
		Roof division,	0 8																			
			0 1																			
			0 7																			
			0 3																			
			0 9																			
			3 0																			
			0 3½																			
		Main division,	0 1																			
			1 1																			
			0 1																			
			1 2																			
	Clay,		0 6																			
	Calcareous nodules and clay,		3 0																			

An analysis of coal from this mine recently made by Otto Wuth, Analytical Chemist of Pittsburgh, shows it to contain as follows :

Water,	0.41 per cent.
Volatile matter,	20.16 " "
Fixed carbon,	67.06 " "
Sulphur, . . . . .	.97 " "
Ash,	2.40 " "
	100.00

Thomas Rankin, Superintendent of Louisville Gas Co., reports this coal to yield 33½ bushels of good coke per ton of coal (2000 lbs.), and 5.04 cubic feet of gas per pound of coal of 16.34 candle power; and J. Fullager, Supt. of the Cincinnati Gas Co. reports a yield of 36 bushels of coke per ton (2000 lbs) of coal, and 5.33 cubic feet of gas per pound of coal from the same mines.

Bearings on *cleavage planes* were obtained as follows :

N. 64 ° W. 6 feet—N. 62½ W. 10 feet.
N. 64 W. 4 " —N. 70 W. 4 "
N. 59¼ W. 6 " —N. 64½ W. 5 "
N. 64¼ W. 10 " —N. 66 W. 8 "



WALTON

WALTON'S UPPER TIPPLE

WALTON'S TIPPLE CO.

N. 65½ W. 6 feet—N. 64½ W. 3 feet.

N. 62 W. 12 " —N. 62 W. 4 "

Clay veins, spars and horsebacks are quite numerous. Some of the clay veins fault the coal members to a considerable extent. One of which I observed to fault the main coal member three feet, along a line bearing N. 40° E. Three small *soot veins* have also been found.

They employ 240 miners, 17 drivers, 14 day men, 21 mules and the output amounts to 17,000 bushels of lump coal per day.

117. JONES MINE, (23 miles from Pittsburgh.)

Located on the west side of the river.

Owned and opened in 1848 by Robert Cunningham and Allen Peel. They built an abutment tipple, a coal road and gravity plane to coal level on the face of the hill.

They operated for some time and Peel sold his interest to Cunningham, who continued to operate until the property passed into the possession of Charles Leadley in 1853. He operated until his decease in 1855, and the mine was sold in 1858 to Thomas, George and William Jones, who built the present road in 1865. Thomas Jones died in 1872, and it became the property of George and William Jones.

The mine was run by them and in their name until 1879, since when it has been operated under the name of George Jones and Company.

It is now owned by Mrs. Rachel Jones, widow of George Jones, deceased.

The coal is hauled from the interior of the mine to the pit mouth by mules, over an outside road 300 yards in length to check house; from thence it passes down a gravity plane 1170 feet in length to a point near the base of the hill, and from there it is hauled to the tipple at the river by horses, an additional distance of 500 hundred yards, crossing the track of the Pittsburgh, Virginia and Charleston railroad at grade.

They employ 110 miners, 7 drivers, 12 day men, and the daily output averages 10,000 bushels of lump coal.

The mine is ventilated by furnace power.

The columnar section obtained is as follows :

	Carbonaceous shale,	0' 6"
	Block slate,	0' 6"
<i>Jones mine Section. (Fig. 44.)</i>	Coal,	0 1½
	Parting,	0 ½
	Coal,	0 5
	Parting,	0 ½
	Coal,	0 4
	Parting,	0 ½
	Coal,	0 1
	Clay,	1 0
	Coal,	1 1
	Parting,	0 ½
	Coal,	0 7
	Parting,	0 ½
	Coal,	0 4
	Black clay from 0 to 1' 6",	0 9
	Main over-clay,	1 0
	Breast coal, (from 2' 10" to 3' 6"),	3 0
	Parting,	0 ½
	Bearing-in coal,	0 3
Parting,	0 ½	
Brick coal,	1 0	
Parting,	0 ½	
Bottom coal,	1 3	
	Under-clay,	

The upper portion of the main breast coal is quite variable in thickness, ranging from 2' 10" to 3' 6". The lower portion of the roof members are much disturbed by what the miners call a "double" clay, which appears to be a horseback between the first and second roof coal members. In some places we find the three inch or little roof coal to be absent and the two clays united. The upper clay however is readily distinguished by its hardness and blackish color, and appears to be a mixture of clay and carbonaceous matter in a comminuted form.

Cleavage planes were obtained as follows :

N. 60½	W. 3 feet	—N. 61	W. 3 feet.
N. 66½	W. 5 "	—N. 65½	W. 2 "
N. 62	W. 8 "	—N. 60¾	W. 8 "
N. 64	W. 3 "	—N. 61¾	W. 4 "
N. 63	W. 6 "	—N. 64½	W. 4 "

118. WALKER MINE, (23 $\frac{1}{10}$ miles from Pittsburgh.)

Situated on the east side of the river.

Robert Walker commenced to open this mine in 1860, and in 1863 it was leased to Alexander Love, who completed the improvements, consisting of a tippie, an incline road, check house and a number of dwelling houses.

He operated until 1864 and sold an interest to Alexander Crumby. They continued to operate until 1865 when Crumby sold his interest to Edwin W. Tower. Tower and Love operated until the spring of 1866, and sub-leased to George Thomas & Co., who operated until 1868. After which it was operated by Tower and Love until the coal was exhausted in 1876.

The property now belongs to the Hon. James G. Blaine.

119. HARVEY O'NEIL MINE, (22 $\frac{7}{10}$ miles from Pittsburgh.)

Located on the east side of the river.

Opened in 1883, by James and Harvey O'Neil. They built an abutment tippie, gravity plane 700 yards in length from the tippie at the river to the pit mouth.

The loaded cars run to the river by gravity, and the empty ones are hauled back by means of a *stationary engine* and wire line, located near the pit mouth.

The main entry is driven single, about 500 yards to the head. One butt has also been driven about 300 yards.

They employ at present 17 miners, 3 day men and 2 drivers, and the output averages 1500 bushels of lump coal per day.

The coal here measures 5 feet 8 inches from the under-clay to the over-clay, including the several partings.

120. LOWER WALTON MINE, (22 $\frac{1}{10}$ miles from Pittsburgh.)

Located in West Elizabeth, and is 21 miles from the last named place by rail.

It was opened by O. P. Berry and James O'Neil in 1859,

who had previously purchased the property from Christopher Ihmson and Erastus Perceval.

They built a chute tipple with a screen, a graded road back to Third Street, and from that point a curved or dished gravity road to the pit mouth near the top of the hill.

They operated until 1865 and sold to Joseph Walton and Peter Haberman. They built a new road and tipple, and operated until 1880 when Haberman sold his interest to Capt. Samuel S. Brown, who again sold it to Joseph Walton, the present owner and operator.

The loaded pit wagons are hauled by mules from the working places of the mine to the parting on the dilly entry, and from thence they are hauled out by means of a wire line and a *stationary engine* placed near the pit mouth. From this point they are transported by a *steam locomotive* through an entry of the old workings to the pit mouth and check house near the top of the front hill, a distance of one and a quarter miles, or a total distance from the parting in the mine of $1\frac{1}{4}$ miles.

The locomotive makes four round trips per hour, and hauls 24 cars at a trip.

From the check house the cars pass down a gravity plane, two at a time, a distance of 300 yards, to the base of the hill, and from thence to the tipple at the river. They use two check drums, 9 feet in diameter, run on separate shafts connected by cog gearing. The lines are of wire and $\frac{1}{2}$ inch in diameter. A line of that kind is reported to last about four years at this place. They use a $\frac{1}{8}$ inch wire line for hauling out of the mine.

The main entry is driven S. 25° W., and eight feet in width. It is called No. 5, and connects with the upper mine. It dips from the pit mouth towards its head at the rate of 22 inches per 100 feet, which enables the cars to be run back into the mine by gravity alone.

The butt entries are driven $7\frac{1}{2}$ feet wide, and all of them run to the outcrop; which provides a fair volume of fresh air to all parts of the mine, without other artificial means. They were found to be quite uniform in width as well as in

height; a portion of the roof coal having been removed which makes them average five and half feet from the floor to roof. They are free from standing water except in the swamp, and just dry enough not to be dusty.

A *swamp* 19 feet in depth and 150 yards in width passes through the south side of this mine and the west side of the upper mine on a bearing of N. 60° E.

They employ 255 miners, 12 drivers and 35 day men, and the output averages 23,000 bushels of lump coal per day.

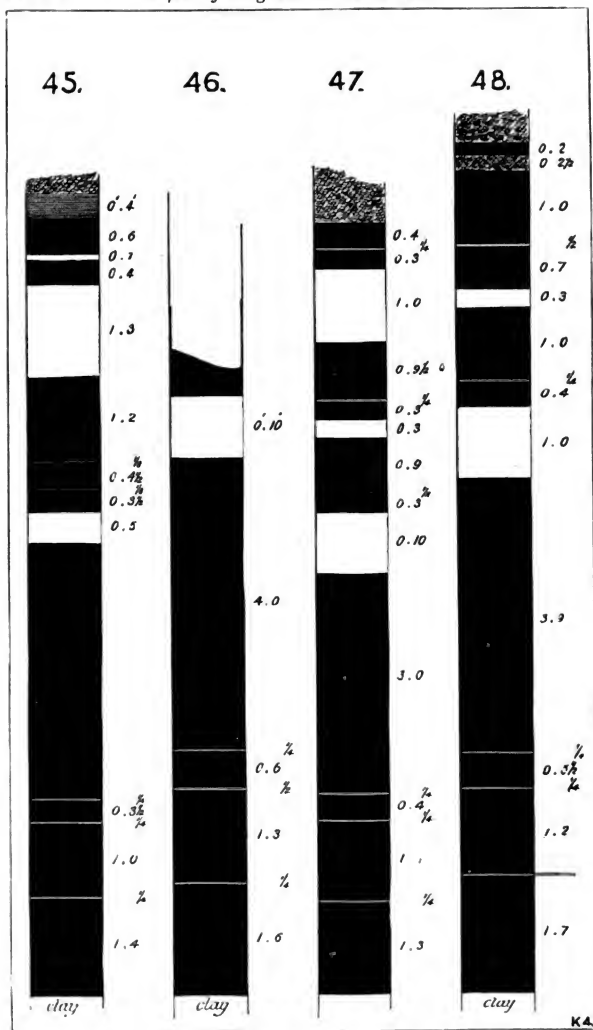
The entire product of the mine yields 70 per cent. of lump, 17 per cent. nut and 13 per cent of dust coal. The lump coal is shipped to the southern markets, the nut coal is sold to steamboats and the Pittsburgh fuel trade, and the dust coal portion is sold to the rolling mills and coke-works in and near the same city.

The following columnar section shows the structural features of the coal bed at this mine:

	Massive sandstone.		
	Sandy shale,	3	0'
	Carbonaceous shale	1	8
	Block slate,	0	4
	{ Coal,	0	6
	{ Clay,	0	1
	{ Coal,	0	4
	{ Clay,	1	3
	{ Coal,	1	2
	{ Parting,	0	$\frac{1}{2}$
	{ Coal,	0	4 $\frac{1}{2}$
	{ Parting,	0	$\frac{1}{2}$
Lower Walton mine Section. (Fig. 45.)	{ Coal,	0	3 $\frac{1}{2}$
	{ Main over-clay,	from 0	2 to 0 8
	{ Breast coal,	3	6
	{ Parting,	0	$\frac{1}{2}$
	{ Bearing-in coal,	0	3 $\frac{1}{2}$
	{ Parting,	0	$\frac{1}{2}$
	{ Brick coal,	1	0
	{ Parting,	0	$\frac{1}{2}$
	{ Bottom coal,	1	4
	{ Under-clay,	0	4
	{ Nodules of impure limestone,	3	0
	{ Sandy shale,		

Cleavage bearings were obtained as follows:

N. 65 $\frac{1}{2}$ W. 4 feet—	N. 66 $\frac{1}{2}$ W. 4 feet.
N. 65 W. 3 " —	N. 65 $\frac{3}{4}$ W. 6 "
N. 68 $\frac{1}{2}$ W. 8 " —	N. 69 $\frac{1}{2}$ W. 16 "



K4.

121. WEST ELIZABETH MINE, (22 miles from Pittsburgh.)

Located on the west side of the river at the north end of West Elizabeth.

Opened in 1840 by Christopher Ihmson and Erastus Perceval. Owen J. Owens also became connected with the firm.

It was a cart pit for several years, and the coal was run down a gravity plane to a slide tippie at the river.

In 1846 they built a new tippie on the abutment plan, and operated until 1849. Charles Ihmson operated from the last named date until 1852. William Hodgson operated from 1857 until 1859, under lease from Ihmson and Perceval, at which time it was sold to James O'Neil. During the same year James O'Neil sold it to J. N. and W. O'Neil, who continue to operate it to the present time.

122. HORNER AND ROBERTS MINE, (22 miles from Pittsburgh.)

Located at Elizabeth, on the east side of the river.

The first opening was made in the coal of the Rosenberg and Sheriff farms, located at the junction of Westbays and Falling-timber runs, during the year 1859, from whence the coal was hauled on an outside road by mules to the tippie at the river, a distance of three fourths of a mile.

The coal at this place, amounting to 100 acres, was exhausted in 1872, and the road was extended one and a quarter miles farther up Falling-timber run, to a point near Haydon's Mill, where an opening was made in the coal on the Johnson farm, which they had purchased together with coals under the Warne, Shrader and Haydon farms. They have made extensive improvements at this place.

The coal is hauled from two main branch entries in the mine, a distance of 656 yards, by means of a wire line and a pair of stationary engines located near the pit mouth. One entry bears S. 25° W. and the other S. 51° W. From the pit mouth the coal is hauled over an outside road by a steam locomotive to the tippie at the river, a distance of two miles. Forty cars are hauled at a trip.

The road is laid with 40 and 50 lbs. steel and iron rails, on ties of locust wood. The average grade of the road is 15 inches to 100 feet, down from the pit mouth.

A *swamp* has been found to pass through the mine from a point at the forks of the two main runs, which bears in a general way S. 50° W. and dips in that direction at the rate of 61 feet in 550 yards. This swamp is 300 yards in width and 30 feet in depth; the continuation of which is supposed to be the same that has been found to pass through the *Old Eagle and Courtney mines* of Pool No. 3.

A section of the main coal members in the swamp was found to give:

		Roof coal.	
<i>Horner & Roberts mine Section. (Fig. 46.)</i>	{	<i>Over-clay</i> ,	0' 10"
		Breast coal,	4 0
		Parting,	0 ½
		Bearing-in coal,	0 6
		Parting,	0 ½
		Brick coal,	1 3
		Parting,	0 ¼
		Bottom coal,	1 6
		Under-clay.	

The following was found to be an average of all the members outside of the swamp:

		Carbonaceous shale.	
<i>Horner & Roberts mine Section. (Fig. 47.)</i>	{	Coal,	0' 4"
		Parting,	0 ½
		Coal,	0 3
		Clay parting,	1 0
		Coal,	0 9½
		Parting,	0 ½
		Coal,	0 3
		Parting,	0 3
		Coal,	0 9
		Parting,	0 ½
		Coal in two members,	{ 0' 1" } 0 3
		<i>Over-clay</i> ,	0 10
		Breast coal,	3 0
		Parting,	0 ½
		Bearing-in coal,	0 4
		Parting,	0 ½
		Brick coal,	1 1
		Parting,	0 ½
Bottom coal,	1 3		
		Under-clay.	



BOSTON

HORNER AND ROBERTS TIPPLE.

RELIGIOUS PRINTING CO.

Clearance planes were found to bear as follows :

N. 63½	W. 4 feet	—N. 62½	W. 5 feet.
N. 62¾	W. 3	“ —N. 65¼	W. 6 “
N. 64¾	W. 8	“ —N. 62	W. 3 “
N. 62	W. 4	“ —N. 59¾	W. 5 “
N. 60¾	W. 4	“ —N. 64½	W. 7 “
N. 63	W. 8	“ —N. 61¼	W. 8 “
N. 61¼	W. 8	“ —N. 64¾	W. 6 “
N. 66	W. 7	“ —N. 64¼	W. 10 “

Ventilation is produced by furnace power. The furnace is 9½ feet in height, 7 feet wide and 24 feet in length, with a brick and stone stack 100 feet in height connecting with rear end furnace.

Five steam pumps are used in delivering the water from the mine. They force the water up through a shaft opening 130 feet in depth.

Two hundred and fifty miners, 13 drivers, 3 trappers and 5 day men are employed, and the output amounts to 14,000 bushels of lump coal per day. Two hundred acres have been mined out at the last named opening.

The bottom of the coal at the pit mouth is 163 $\frac{6}{10}$ feet above pool water. This mine is worked on the double entry system.

Matthew McCreavy is superintendent.

123. LOVEDALE MINE, (21 $\frac{1}{10}$ miles from Pittsburgh.)

Located on the east side of the river.

Owned and opened in 1870 by Alexander Love. He built the road and tipple, and operated until June, 1876, and sold to John A. Wood and William Shrader. They operated until 1882, and Shrader sold his interest to John A. Wood & Son, who continue to operate the mine.

The main entry is driven S. 50° E. 2100 feet, and from that point on a bearing of S. 35° E. 2250 feet to its head. The general dip of the coal bed here is in a south-east direction, except along the line of the swamp which passes through the mine on a bearing of S. 35 E. This *swamp* is reported at 100 feet in depth and 700 yards in width.

9 K'.

The mine is worked under both the double and single entry systems. The rooms are widened out in sets of ten each alternately to the right and left. That is, ten are widened to the left and ten to the right, and every eleventh room is widened out both ways. This plan enables them to draw or take out the ribs between rooms whenever a block of ten rooms are worked out without endangering the rooms of adjoining blocks.

The coal is hauled from a point on the main entry at bottom of the swamp, a distance of 1,458 yards from the pit mouth, by means of a wire rope and stationary engine located about 50 yards outside of pit mouth. The cars run by the acquired momentum from the engine house to the check house a distance of 100 yards.

The bottom of the *swamp* is 108 feet lower than the coal at the pit mouth which enables the empty cars to be returned by gravity.

From the check house the loaded cars pass down a gravity plane to the base of the hill, from whence they are hauled by a steam locomotive, a distance of one mile, to the tipple at the river, in trains of 22 cars each.

Clay veins and *spars* are quite numerous in the south part of the mine, but none were observed in the north part.

At a point on Entry No. 2, 70 yards east from the bottom of the swamp, a *roll* in the under-clay passes through a large portion of the mine in a north and south direction. This roll is bounded on each side by a fault that uplifts the coal on the side of the roll to the height of two feet; and the coal is otherwise much fractured and disturbed between the two faults. The coal along the lines of fracture presents highly polished surfaces, resulting no doubt from the fractured surfaces being rubbed together.

The carbonaceous shale overlying the roof coal is unusually thin at all of the exposures observed, and in a large portion of the mine is entirely absent, and the gray sandstone rests immediately on the upper member of the roof coal.

The following columnar section was obtained in the swamp:

	Coarse gray sandstone.		
	Carbonaceous shale, inclosing balls of carbonate of iron—from 0 to	1'	0"
Lovedate mine Section. (Fig. 48.)	}	Coal,	0 2
		Carbonaceous shale,	0 2½
		Coal,	1 0
		Parting,	0 ¼
		Coal,	0 7
		Clay parting,	0 3
		Coal,	1 0
		Parting,	0 ¼
		Coal,	0 4
		Over-clay,	1 0
		Breast coal,	3 9
		Parting,	0 ¼
		Bearing-in coal,	0 5½
		Parting,	0 ¼
		Brick coal,	1 2
		Parting,	0 ¼
Bottom coal,	1 7		
	Under-clay.		

The following bearings on *cleavage planes* were observed in the swamp near the before mentioned roll:

N. 60½ W. 5 feet—N. 58½ W. 4 feet—N. 59½ W. 8 feet.

The cleavage planes are broken and disturbed as to direction, along the line of the faults, for a distance of from five to six yards on each side of them.

The *Cleavage planes* in other parts of the mine were found to bear:

N. 65¾° W. 6 feet—N. 66¼ W. 5 feet.

N. 70 W. 10 " —N. 65 W. 4 "

The mine is ventilated by means of exhaust steam from the pumps, which escapes into a shaft at that point. They have a furnace and shaft in the north part of the mine which is not in use at present.

Some trouble is being experienced with *fire damp* (carburetted hydrogen) at the head of the advanced workings, which are being driven up the east side of the swamp. The coal here contains that gas in considerable quantities, and it collects so rapidly at the heads of the entries, that it is necessary to maintain a vigorous air current close up to

the heads of the working places, to enable the men to work with naked lights, or the ordinary mining lamp.

The bottom of the coal at the main pit mouth is 237 $\frac{7}{8}$ feet above pool water.

They employ 150 miners, 11 drivers, 1 day men and 13 mules, and the daily output is 10,000 bushels of lump coal, 100 acres have been mined out of the McGill farm and 65 acres out of the Fife farm.

124. BELLEVUE MINE, (20 $\frac{1}{2}$ miles from Pittsburgh.)

Located on the east side of the river.

Opened in 1845 by James Edgar and Wm. McCaslin ; after which it was operated successively by George Bradshaw, Peter Pinkney and Judge Thomas Mellon and sold to John Gumbert, Thomas Farrow and Wm. Huey in 1858.

They ran coal over the old road and tipple for a few months, and during the same year built a new slide tipple and gravity plane. The present tipple was built during 1883.

The property now belongs to Wm. Huey and the heirs of John Gumbert, deceased. The head of the present workings is in the second hill two miles from the river.

The coal is hauled from the workings, a distance of one mile, by means of a stationary engine located between the two hills, and the empty cars are returned by gravity. The full cars then run by gravity to a point in the first hill 500 yards from the engine, and from the last named point they are hauled to the front pit mouth, a distance of 800 yards more by horses. And from this point they run over a gravity plane to a tipple at the river. The cars are hauled in trains of 40 cars each, making a round trip in 25 minutes.

All of the butt entries are driven to the outcrop, which provides very fair ventilation to the mines without other means.

They employ 140 miners, 10 drivers, 5 day men at engine and in the mine, 5 at the check house, 2 at the smith-shop, 5 at the river, and 13 mules.

The daily output averages 12,000 bushels of lump coal. 335 acres have been mined out, and 155 acres remain unmined.

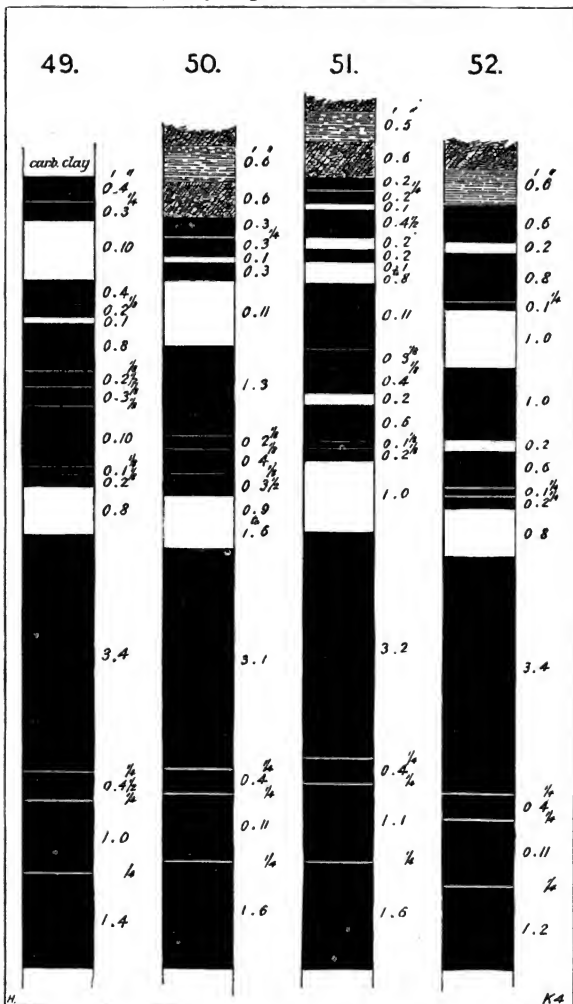
The columnar section is as follows:

		Carbonaceous shale.	
Bellevue mine Section. (Fig. 49.)	{	Coal,	0' 4"
		Parting,	0 ½
		Coal,	0 3
		Clay,	0 10
		Coal,	0 4
		Parting,	0 ½
		Coal,	0 2
		Clay,	0 1
		Coal,	0 8
		Parting,	0 ½
		Coal,	0 2½
		Parting,	0 ½
		Coal,	0 3
		Parting,	0 ½
		Coal,	0 1
		Parting,	0 ½
		Coal,	0 1
		Parting,	0 ½
		Coal,	0 2
		Main over-clay,	0 8
Breast coal,	3 4		
Parting,	0 ½		
Bearing-in coal,	0 4½		
Parting,	0 ½		
Brick coal,	1 0		
Parting,	0 ½		
Bottom coal,	1 4		

Under-clay.

Cleavage planes were obtained, as follows:

N. 61¼°	W. 6 feet—	N. 58½	W. 3 feet.
N. 59¼	W. 3 "	—N. 60	W. 4 "
N. 64	W. 3 "	—N. 60¾	W. 6 "
N. 65¼	W. 8 "	—N. 60½	W. 3 "
N. 61	W. 5 "	—N. 59½	W. 10 "
N. 60¾	W. 6 "	—N. 62½	W. 6 "



125. ROBBINS AND JENKINS MINE, (18 $\frac{1}{10}$ miles from Pittsburgh.)

Located on the east side of the river.

Opened by George Bradshaw. He operated until 1851, and the mine passed into possession of Pollock, Lee and Dunseath, who operated until 1857, and were succeeded by Thomas Phillips and William Stone. They operated until 1859, and were succeeded by Wm. Robbins and Robert Jenkins, who operated until 1880, and were succeeded by the present operators, Wm. Robbins & Company.

The following columnar section was obtained :

	Carbonaceous shale	
	Block slate,	0' 6"
	Carbonaceous shale,	0 6
<i>Robbins & Jenkins mine. Section. (Fig. 50.)</i>	{ Coal,	0 3
	{ Parting,	0 1
	{ Coal,	0 3
	{ Clay parting,	0 1
	{ Coal,	0 3
	{ Clay,	0 11
	{ Coal,	1 3
	{ Parting,	0 1
	{ Coal,	0 2
	{ Parting,	0 1
	{ Coal,	0 4
	{ Parting,	0 1
	{ Coal,	0 3 $\frac{1}{2}$
	{ <i>Main over-clay, from 0 to 1 6'</i>	0 9
	{ Breast coal,	3 1
	{ Parting,	0 1
	{ Bearing-in coal,	0 4
	{ Parting,	0 1
	{ Brick coal,	0 11
	{ Parting,	0 1
{ Bottom coal,	1 6	
	Under-clay.	

The *main over-clay* is absent in a large portion of the mine, leaving but a mere parting between the main breast and roof coal members. In other parts of the mine it is found in the form of *rolls* or *horsebacks*.

The mine is worked on the single entry system. The butt entries are driven eight feet in width and 150 yards apart.

A stationary engine is located in the mine on the main entry 700 yards from the pit mouth, which hauls the cars

to that point from a parting 900 yards farther in the mine ; and from this point they are hauled to the pit mouth by horses. The empty cars run back from the engine to the parting by gravity.

A shaft 170 feet in depth is sunk at the engine through which the smoke and exhaust steam passes from the mine.

Three of the butt entries are driven out to the crop which furnishes ventilation without the use of mechanical means.

The cars pass from the check house down a gravity plane 380 yards in length to the tipple at the river.

They employ 150 miners, 7 drivers inside and 5 drivers outside, and the output averages 10,000 bushels of lump coal per day.

126. BLACKBURN MINE, (18 miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1856 by R. M. and Dr. Blackburn. They built a tipple and gravity plane, operated to the river trade and sold an interest to Whitmore, Wolf and Lain.

In 1875 the property was sold to the present owners and operators, Thomas Foster, Sanford Clark and John A. Wood.

The coal is hauled from a point on the main entry in the second hill to the front pit mouth of the first hill, a distance of 985 yards by means of a stationary engine and wire line, located between the two hills, and from the last named pit mouth the cars are hauled to the check house by horses, a distance of 300 yards, and thence down a gravity plane 1400 feet in length, three cars at a time, to the tipple at the river. They use a $\frac{3}{4}$ -inch wire line on the gravity plane, and a drum 12 feet in diameter in the check house.

They use an "Improved Steam Blake" pump to deliver the water from the swamp in the north part of the mine. It has an 18-inch stroke, 16 inch steam cylinder, 8-inch water cylinder, and requires to be run 15 hours per day.

The mine is ventilated by the exhaust steam from the pump and a *fire basket*, which forces the air up through a

shaft and stack 145 feet in height. The volume of air passing through the mine was found to be 13,450 cubic feet per minute.

They employ 200 miners, 9 drivers, one trapper, and 17 day men, and the output averages 13,000 bushels of lump coal per day.

The total area mined out amounts to 170 acres, and 110 acres remain unmined.

The following columnar section was obtained:

	Carbonaceous shale.	
	Block slate,	0' 5"
	Carbonaceous shale,	0 6
<i>Blackburn mine</i> <i>Section.</i> <i>(Fig. 51.)</i>	Coal,	0 2
	Parting,	0 ½
	Coal,	0 2
	Clay,	0 1
	Coal,	0 4½
	Clay,	0 2
	Coal,	0 2
	Clay, from 1' to	0 8
	Coal,	0 11
	Parting,	0 ½
	Coal,	0 3
	Parting,	0 ½
	Coal,	0 4
	Clay,	0 2
	Coal,	0 6
	Parting,	0 ½
	Coal,	0 1
	Parting,	0 ½
	Coal,	0 2
	Main over-clay,	1 0
Breast coal,	3 2	
Parting,	0 ½	
Bearing-in coal,	0 4	
Parting,	0 ½	
Brick coal,	1 1	
Parting,	0 ½	
Bottom coal,	1 6	
	Under-clay.	

Cleavage planes obtained :

N. 64½ W. 5 feet—N. 67½ W. 6 feet.
N. 63½ W. 5 " —N. 67½ W. 4 "
N. 65½ W. 5 " —N. 67 W. 4 "
N. 66¾ W. 4 " —N. 68½ W. 3 "
N. 62¼ W. 5 " —N. 65 W. 3 "

Thomas Gray is mine boss.

127. PINE-RUN MINES, (17 $\frac{1}{2}$ miles from Pittsburgh.)

Situated on the west side of the river.

The first opening was made in the coal of the front hill on the west side of Pine run in 1850 by John O'Neil. He built a gravity plane and an apron drop tippie at the river.

The full cars were run by gravity from the pit mouth to the tippie and the empty ones were hauled back by a horse. The horse would ride from the pit mouth to the river in an empty car connected with each train of loaded cars.

The coal of the front hill was mined out, amounting to 30 acres, and the road was extended up on the same side of the run and a second opening made and a second incline plane built. An area of 75 acres was mined out at this place.

After which (in 1865) the road was graded and extended up to a point three fourths of a mile from the river, and a third opening made in the McGowen coal on the same side of the run.

A gravity plane was also built at this place, from the pit mouth down to the base of the hill, from which point the coal was hauled to the tippie at the river by a locomotive engine. One hundred acres of coal were mined out at this opening. About the same time a fourth opening was made in the Abers coal on the east side of the run, where they are still working. Eighty-six acres have been mined out of the Abers tract.

They abandoned the third opening in 1874, and opened the fifth mine in the Finney coal, where they are also working at present. About 80 acres of the Finney coal have been mined out.

During the last summer they built a new incline, to mine out the remaining portion of the Abers coal consisting of about 40 acres, but no coal has been run from this place yet. The distance from the fifth mine to the river is one and a half miles.

These mines are worked on the double entry system.

They employ at the fourth or Abers mine, 80 miners, 3 drivers, 1 trapper and 7 day men; at the fifth or Finney mine, 170 miners, 8 drivers, 6 trappers and 6 day men, and

the combined output of the two mines amounts to 20,000 bushels of lump coal per day.

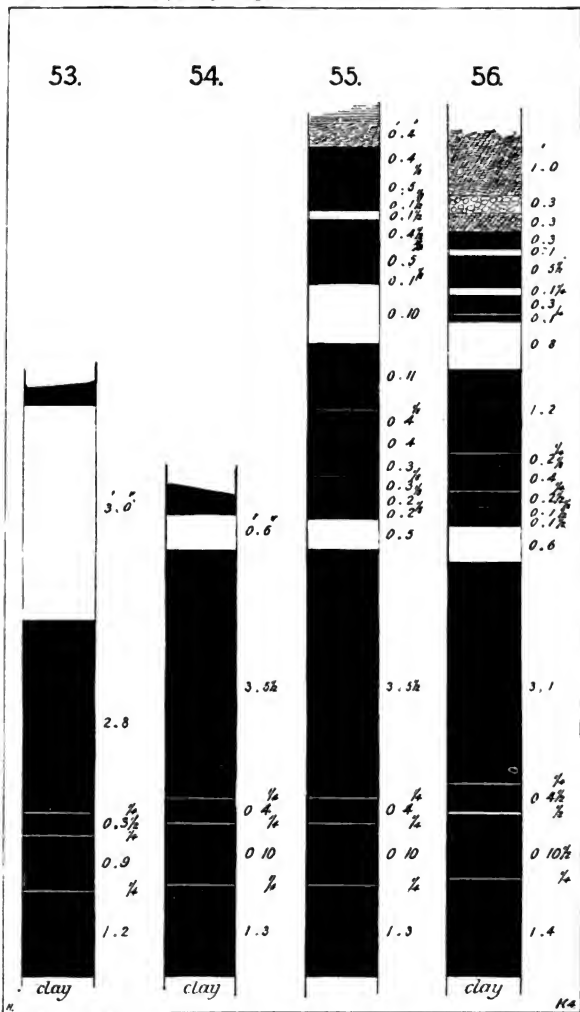
The coal is screened into three grades, lump, nut and dust, in the proportions of 70 per cent. lump, 15 per cent. nut, and 15 per cent. dust coal.

The *ventilation* is produced by furnace power. The furnace is arched and built of brick on a stone foundation, 24 feet in length, 8 feet wide inside, $4\frac{1}{2}$ feet above the grate bars and 3 feet under them. It rises 2 feet from front to rear. The fire-bed is formed of two sets of bars five feet each in length, giving a fire surface of 8 by 10 feet. They are only using one set of the bars at present. This gives an air current, at a point near the mouth of furnace, of 27,500 cubic feet per minute, after passing around through the workings; and by making a direct connection with the outside air I found the volume increased to 45,100 cubic feet per minute.

The following columnar section was obtained near the furnace:

	Carbonaceous shale.		
	Block slate,	0	6
Pine Run mine Section. (Fig. 52.)	Coal,	0	6
	Clay,	0	2
	Coal,	0	8
	Parting,	0	↓
	Coal,	0	1
	Clay,	0	10
	Coal,	1	0
	Clay parting, from $\frac{1}{2}$ to	0	2
	Coal,	0	6
	Parting,	0	↓
	Coal,	0	1
	Parting,	0	↓
	Coal,	0	2
	Main over-clay,	0	8
	Breast coal,	3	4
	Parting,	0	↓
	Bearing-in coal,	0	4
Parting,	0	↓	
Brick coal,	0	11	
Parting,	0	↓	
Bottom coal,	1	2	
	Under-clay.		

At another part of the mine I found the *breast* coal to



measure only 2' 10'', without any material variation in the other members. The under-clay is very hard, and includes numerous nodules of impure limestone.

I found the *cleavage planes* to bear as follows:

N. 61 °	W. 3 feet	—	N. 59½	W. 2 feet.
N. 65½	W. 6 "	—	N. 61½	W. 4 "
N. 63	W. 4 "	—	N. 65	W. 3 "
N. 61	W. 6 "	—	N. 63	W. 4 "
N. 62½	W. 3 "	—	N. 64	W. 5 "

A *swamp* 50 feet in depth and 200 yards in width is found in the Abers mine. It is reported as being an elliptical basin with no drainage outlet. A *fault* is found along its margin that displaces the coal members about three feet; the downthrow being on the side of the basin. Considerable difficulty was experienced in obtaining the coal from this swamp.

Numerous *horsebacks* or *swells* in the over-clay were observed from 1½ to 3½ feet in thickness and from 2 to 14 feet in length.

128. ROCK-RUN MINE, (17²/₅ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1853 by William Hodgson and John Watson, under a twenty-year lease from James Snodgrass.

Hodgson operated to the river trade until 1869, and sold the remaining portion of the lease to Oliver Culp and James Gamble.

They operated until 1878, since then it has been operated by Wm. J. Snodgrass, son and sole surviving heir of James Snodgrass, deceased.

They abandoned the old workings in 1879, except the main tunnel which is driven out at the north side, and connects with an outside road 600 yards in length, over which the coal is being hauled from the present workings in the "eighty acre" tract. This tract lies between the Allequippa and Camden mines

The coal is hauled from the mine to the check house, on the face of the river hill, a distance of 1300 yards, by mules,

and from the check house it passes down a gravity plane of 1100 feet in length to the tippie at the river.

80 miners, 4 inside drivers, 2 outside drivers and 10 day men are employed, and the output averages 8000 bushels per day.

Horsebacks and *clay veins* are numerous. Many of the horsebacks are large, and the lower or main coal members under them are often much reduced in thickness. The over-clay is often quite thin, and occasionally entirely absent between the horsebacks.

The following section was measured under a horseback:

<i>Rock Run mine</i> <i>Section No. 1.</i> <i>(Fig. 53.)</i>	}	Coal, (upper member.)	
		Horseback or roll in the over-clay.	3' 0"
		Breast coal,	2 8
		Parting,	0 ↓
		Bearing-in coal,	0 3½
		Parting,	0 ↓
		Brick coal,	0 9
		Parting,	0 ↓
		Bottom coal,	1 2

Under-clay.

Another section was measured at a point 20 feet distant from the horseback, and gave as follows:

<i>Rock Run mine</i> <i>Section No. 2.</i> <i>(Fig. 54.)</i>	}	Coal, (upper member.)	
		Over-clay,	0' 6"
		Breast coal,	3 5½
		Parting,	0 ↓
		Bearing-in coal,	0 4
		Parting,	0 ↓
		Brick coal,	0 10
		Parting,	0 ↓
		Bottom coal,	1 3

Under-clay.

The major axis of the horsebacks are reported to bear north east and south-west. In some parts of this mine I find the lower portion of the over-clay to be composed of quite pure *limestone*, ranging from a half to two inches in thickness. It appears to be a distinct member from the over-clay, and often falls away from it when the underlying coal is removed.

A *soot vein* passes through the mine in approximately an east and west direction, and the coal along its course is considerably fractured for several feet on both sides, rendering it of little value except for nut and dust purposes.

Bearings on *cleavage planes* were obtained as follows:

N. $63\frac{1}{2}$ W. 3 feet—N. $63\frac{1}{4}$ W. 4 feet.
 N. $61\frac{3}{4}$ W. 3 " —N. $59\frac{1}{2}$ W. 3 "
 N. $66\frac{1}{4}$ W. 3 " —N. $63\frac{3}{4}$ W. 8 "

129. ALLEQUIPPA MINE, (16 $\frac{1}{16}$ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1856 by James O'Neil. He operated in partnership with Biddle Coursin until 1859, and sold the property to Wm. Whigham, M. Bailey and James Wilson. They operated until 1881, when Whigham sold his interest to Nicholas O'Neil, Wm. O'Neil, I. N. Large, and S. P. Large, who together with Bailey and Wilson comprise the present operators.

The present workings are in the Third and Fourth hills, and the coal is hauled by mules to a point or parting in the Third hill, and from that point the cars run by gravity, in trains of 60 cars each, through the Second and First hills to the first check house, a distance of 1300 yards. It requires four mules to return the empty cars to the parting again. They make twelve trips per day.

The loaded cars run down a gravity plane from the first to the second check house, and from the second check house to the tipple at the river, an additional distance of nearly a half mile.

180 miners, 3 trappers, 9 inside drivers, 2 outside drivers and 2 day men are employed, with the usual number of checkmen and tippemen, and the daily output averages 16,000 bushels of lump coal. 291 acres have been mined out and 500 acres remain unmined connected with the works.

The *ventilation* is produced by a furnace and stack, notwithstanding the fact that many of the entries reach the outcrop at no very great distance, which would under favorable circumstances furnish a large amount of fresh air without the use of the furnace. It is, however, well in all such cases to have a good furnace or fan at a point where it can be used, in case the natural air currents fail to afford the necessary volume of air to the head of the working places.

The following columnar section was obtained:

	Sandy carbonaceous shale.	
	Block slate,	0' 6"
	Carbonaceous shale,	0 4
<i>Allequippa mine</i> <i>Section.</i> <i>(Fig. 55.)</i>	Coal,	0 4
	Parting,	0 ½
	Coal,	0 5
	Parting,	0 ½
	Coal,	0 1½
	Clay,	0 1½
	Coal,	0 4½
	Parting,	0 ½
	Coal,	0 5
	Parting,	0 ½
	Coal,	0 1
	Clay,	0 10
	Coal,	0 11
	Parting,	0 ½
	Coal,	0 4
	Parting,	— —
	Coal,	0 4
	Parting,	— —
	Coal,	0 3
	Parting,	0 ½
	Coal,	0 3
	Parting,	0 ½
	Coal,	0 2
	Parting,	0 ½
	Coal,	0 2
	Main over-clay,	0 5
	Breast coal,	3 5½
	Parting,	0 ½
	Bearing-in coal,	0 4
	Parting,	0 ½
	Brick coal,	0 10
	Parting,	0 ½
Bottom coal,	1 3	
	Under-clay,	0 7
	Impure limestone,	1 6
	Calcareous and sandy shale,	2 0

Clearance plane bearings were obtained as follows:

N. 63½	W. 3 feet	—N. 65¾	W. 4 feet.
N. 57¾	W. 4 "	—N. 63¾	W. 4 "
N. 65	W. 6 "	—N. 63½	W. 5 "
N. 61¾	W. 4 "	—N. 62	W. 3 "
N. 64¾	W. 3 "	—N. 59½	W. 5 "
N. 63	W. 5 "	—N. 64	W. 6 "

130. CAMDEN MINE, (16 $\frac{5}{10}$ miles from Pittsburgh.)

Located at Camden on the west side of the river.

Owned and opened up in 1852 by James O'Neil.

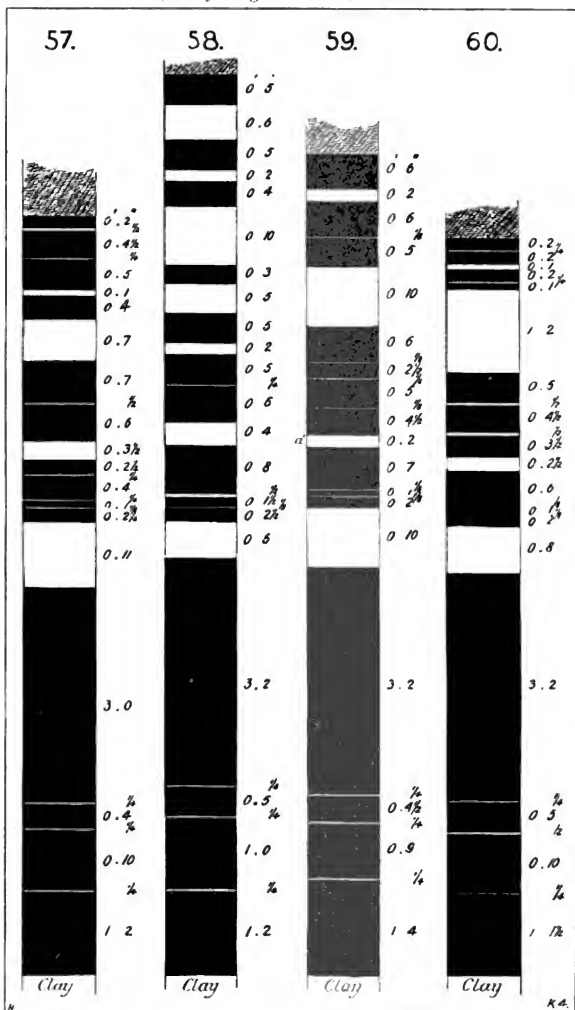
He built a tippie, gravity plane and check house, and operated until 1855; at which time he sold the property to Isaac Jones and J. D. Miller. They operated and sold the mine to George Lysle & Sons, who operated until Lysle's decease.

The property now belongs to the sons, George and Addison Lysle, who continue to operate the mine.

The following columnar section was obtained, which illustrates the structural features of the coal bed at this place:

	Sandstone shale.		
	Carbonaceous shale,	5'	0 "
	Block slate,	0	8
	Carbonaceous shale,	1	0
	Balls of carbonate of iron,	0	3
	Carbonaceous shale,	0	3
Camden mine Section. (Fig. 56.)	} Little roof coal,	Coal,	0 3
		Clay,	0 1
		Coal,	0 5 $\frac{1}{2}$
		Clay,	0 1 $\frac{1}{2}$
		Coal,	0 3
		Parting,	0 $\frac{1}{4}$
		Coal,	0 1
		Clay,	0 8
		Coal,	1 2
		Parting,	0 $\frac{1}{4}$
		Coal,	0 2
		Parting,	0 $\frac{1}{4}$
		Coal,	0 4
		Parting,	0 $\frac{1}{4}$
		Coal,	0 2 $\frac{1}{2}$
		Parting,	0 $\frac{1}{4}$
		Coal,	0 1 $\frac{1}{2}$
		Parting,	0 $\frac{1}{4}$
		Coal,	0 1 $\frac{1}{2}$
			Main over-clay, . . . . .	0 6
	Breast coal,	3 1	
	Parting,	0 $\frac{1}{4}$	
	Bearing-in coal,	0 4 $\frac{1}{2}$	
	Parting,	0 $\frac{1}{2}$	
	Brick coal,	0 10 $\frac{1}{2}$	
	Parting,	0 $\frac{1}{4}$	
	Bottom coal,	1 4	
	Under-clay.		

10 K'.



Clearage plane bearings were obtained as follows :

N. $68\frac{1}{2}$ W. 3 feet—N. 62 W. 2 feet.

N. $62\frac{1}{2}$ W. 3 “ —N. 64 W. 5 “

N. $63\frac{1}{4}$ W. 4 “ —N. 65 W. 4 “

The present workings are in the second hill, the coal of the first hill having been exhausted some time since.

The product of the mine is hauled by mules from the workings, through a tunnel in the first hill, to a check house near the front pit mouth, a distance of one mile, and from thence it passes down a gravity plane 420 yards in length to the second check house, and from thence down a continuation of the same plane 420 yards more to the tipple at the river. Three cars are run down this plane at a time. The elevation of the tipple floor above pool water is 35 feet.

They employ 200 miners, 15 drivers, 2 trappers and 18 day men ; and the output averages 14,600 bushels of lump coal per day.

131. AMITY MINE, (15 $\frac{1}{2}$ miles from Pittsburgh.)

Located at Amity on the west side of the river.

Opened by the owner John C. Risher in 1851. He built a tipple, gravity plane and check house, and leased the mine to Daniel Bushnell, who operated and run coal by river until 1859. Since that time it has been operated by Risher alone. He purchased the coal remaining in the Dravo mine, consisting of 115 acres, in 1867, which has since all been run out through the Amity mine, together with 300 acres additional of the Amity coal. About 308 acres still remain unmined at this place.

The workings and improvements are well arranged and in good condition. The coal is now hauled from the second hill to and through a short tunnel in the point of the first hill, and thence on an outside road to the check house by mules, a total distance of about 700 yards ; and from the check house it passes down a gravity plane, 750 yards in length, to the tipple at the river ; four cars being run down and up at a time.

They employ 175 miners, 14 drivers and 15 day men, and the output averages 15,000 bushels of lump coal per day.

The following columnar section represents the general structural features of the coal bed at this place:

		Carbonaceous shale.	
<i>Amity mine</i> <i>Section No. 1.</i> <i>(Fig. 57.)</i>	{	Coal,	0' 2"
		Parting,	0 ½
		Coal,	0 4½
		Parting,	0 ½
		Coal,	0 5
		Clay parting,	0 1
		Coal,	0 4
		Clay parting,	0 7
		Coal,	0 7
		Clay parting,	0 ½
		Coal,	0 6
		Clay parting,	0 3½
		Coal,	0 2½
		Parting,	0 ½
		Coal,	0 4
		Parting,	0 ½
		Coal,	0 1
		Parting,	0 ½
		Coal,	0 2½
		Breast coal,	
		Parting,	
		Bearing-in coal,	
		Parting,	
		Brick coal,	
		Parting,	
		Bottom coal,	
		Under-clay.	

A *swamp* 14 feet in depth and 600 feet in width is found passing through this mine in a serpentine manner; the direction varying at different points in its course, from north-west to west, south-west, south and south-west.

A section of the main coal members in this swamp was found to give:

<i>Amity mine</i> <i>Section No. 2.</i>	{	<i>Over-clay,</i>	1' 0"
		Breast coal,	3 8
		Parting,	0 ½
		Bearing-in coal,	0 5
		Parting,	0 ½
		Brick coal,	1 1
		Parting,	0 ½
		Bottom coal,	1 6
		Under-clay.	



AMITY

AMITY MINE TIPPLE

AMITY MINING CO.

Cleavage plane bearings were found to be as follows :

N. 63 $\frac{1}{4}$ W. 4 feet—	N. 65 $\frac{1}{2}$ W. 3 feet.
N. 64 $\frac{1}{4}$ W. 3 “ —	N. 69 W. 4 “
N. 66 $\frac{1}{4}$ W. 4 “ —	N. 65 $\frac{3}{4}$ W. 4 “
N. 62 $\frac{1}{2}$ W. 4 “ —	N. 63 $\frac{1}{2}$ W. 5 “
N. 64 $\frac{3}{4}$ W. 10 “ —	N. 64 W. 6 “

The mine is ventilated by furnace power. The furnace is built of brick, in an arched form, lined inside with fire brick, 24 feet in length, 7 feet wide, 4 $\frac{1}{2}$ feet above the grate bars to comb of arch, and 3 feet under the bars to the floor. The rear end of furnace is 8 feet from front side of the shaft. The shaft is 60 feet in depth, surmounted by a wooden stack 30 feet in height.

Jacob Heasley is superintendent of the mine.

132. HUNTER MINE, (15 $\frac{1}{10}$ miles from Pittsburgh.)

Located on the east side of the river, opposite to Amity.

It was opened in 1836 by Thomas Hunter, who operated it as a cart pit until 1840, and no coal has been mined from this place since that time.

The coal was screened at the pit mouth into tram wagons, that run on a gravity plane to a side tippie at the river.

133. DRAVOSBURG MINE, (15 $\frac{1}{10}$ miles from Pittsburgh.)

Located at Dravosburg.

Opened by James O'Neil in 1845. He built a gravity plane, an abutment tippie and operated by river until 1851, and sold the property to Michael Dravo and sons. They changed the old tippie, (that of the slide form,) built six coke ovens and manufactured coke from the slack coal. The coke was shipped mainly to the Cincinnati and Louisville markets.

The property was sold to John C. Risher in 1867, and the remaining portion of the coal run out through the Amity mine.

The area mined out here amounts to 227 acres.

Jonathan Householder & Brother operated near this place

in a small way a few years prior to the opening of the above mentioned mine. The coal was hauled from the pit mouth to the river bank in road wagons, where it was stocked for loading into boats at a favorable stage of water.

134. STONE'S MINE, (15 $\frac{1}{16}$ miles from Pittsburgh.)

Located on the west side of the river, at the north end of Dravosburg.

Owned and opened by William and John Whigham in 1835.

They built a slide tippie and gravity plane and operated until the fall of 1839, at which time the road slipped down the hill, and could no longer be used for running coal over it. In consequence of which they abandoned this place and moved about 300 yards up the river to the place where the present tippie stands, built a gravity plane and slide tippie, and commenced to run coal from the last named place in 1840.

They continued to operate until 1856, and sold the property to Wm. Stone and — McGrew. Stone purchased the interest of his partner and operated until his death; since then it has been operated by his sons Joseph A., George W., William, Thomas and John Stone.

The coal is hauled from the interior of the mine to the pit mouth by mules, and from there to the check house by a steam locomotive, a distance of one and a half miles, where it is screened into iron tram wagons, having two compartments, one for holding the lump coal and the other for holding the slack coal. The wagons pass down a gravity plane to the foot of the hill where a knocker causes the slack to fall into a hopper, located under the road, and the wagon passes on with the lump coal to the tippie at the river. The slack coal is hauled in wagons from the hopper to the slack tippie, located a short distance down the river from the other tippie.

The mine is ventilated by furnace power. The furnace is arched, built of brick, lined inside with fire brick, and

rests on a stone foundation two feet in height. Its length is 18 feet, width $6\frac{1}{2}$ feet and height 5 feet. The grate bars are in two sets, $5\frac{1}{2}$ feet each in length; giving a fire bed 11 feet in length by $6\frac{1}{2}$ feet in width. The shaft and stack together amounts to 80 feet in height. The volume of air passing through the furnace was found to be 20,300 cubic feet per minute.

150 miners, 8 drivers, 1 trapper and 17 day men are employed; and the daily output averages 14,000 bushels of lump coal.

Clay veins and *spars* are rarely found here. *Horsebacks* or *rolls* in the main over-clay are numerous, sometimes measuring two feet in thickness and 30 feet in width. The coal under them is usually depressed. This depression sometimes is found to affect all of the members from the over-clay to the under-clay.

The columnar section is as follows:

Carbonaceous shale.			
	Coal,	0'	5"
	Clay,	0	6
	Coal,	0	5
	Clay,	0	2
	Coal,	0	4
	Clay,	0	10
	Coal,	0	3
	Clay,	0	5
	Coal,	0	5
	Clay,	0	2
	Coal,	0	5
	Parting,	0	$\frac{1}{4}$
Stone's mine Section. (Fig. 58.)	Coal,	0	6
	Clay,	0	4
	Coal,	0	8
	Parting,	0	$\frac{1}{2}$
	Coal,	0	$1\frac{1}{2}$
	Parting,	0	$\frac{1}{2}$
	Coal,	0	$2\frac{1}{2}$
	Main over-clay,	0	6
	Breast coal,	3	2
	Parting,	0	$\frac{1}{2}$
	Breast coal,	0	5
	Parting,	0	$\frac{1}{2}$
	Brick coal,	1	0
Parting,	0	$\frac{1}{2}$	
Bottom coal,	1	2	
	Under-clay.		

The *Cleavage planes* in a large portion of this mine are so variable in direction that difficulty is experienced in preserving a uniform direction for the butt entries, without the aid of sight points given by an engineer. The following cleavage bearings were obtained :

N. 61 $\frac{1}{4}$ W. 4 feet—	N. 63 $\frac{1}{4}$ W. 8 feet.
N. 58 $\frac{3}{4}$ W. 5 “ —	N. 55 $\frac{1}{2}$ W. 3 “
N. 66 $\frac{1}{4}$ W. 6 “ —	N. 66 $\frac{3}{4}$ W. 6 “
N. 61 $\frac{3}{4}$ W. 3 “ —	N. 66 $\frac{1}{4}$ W. 3 “
N. 58 $\frac{1}{2}$ W. 3 “ —	N. 64 $\frac{1}{2}$ W. 6 “
N. 63 $\frac{3}{4}$ W. 8 “ —	N. 67 $\frac{1}{2}$ W. 6 “
N. 64 $\frac{1}{2}$ W. 10 “ —	N. 64 W. 10 “

One cleavage plane, 6 feet in length, was observed to be bent or curved 3 $\frac{1}{4}$ inches out of a straight line connecting its ends. The bearing from end to end was found to be N. 64° W.

Examples of curved or bent cleavage are quite numerous in this mine.

135. BLACKSTOCK MINE, (15 miles from Pittsburgh.)

Located on the west side of the river.

Operated in 1840 by Robert Sinclair. He operated and was succeeded in 1842 by John Speece and John Painter, who operated until 1844 and were succeeded by John Loomis. He operated until 1846, and the mine remained idle until 1847; from which time it was operated by George Blackstock & Son until 1851. They sold it to David and Andrew Smith, who operated until 1870 and leased it to Foster & Clark. They operated until 1875, and the property was sold to William Neel, who worked the remaining coal during the following year.

The total area mined out amounted to 200 acres.

136. GALLATIN MINE, (14 $\frac{5}{10}$ miles from Pittsburgh.)

Located on the west side of the river opposite to the town of McKeesport.

Opened in 1837 by Abraham Gallatin. He operated until the spring of 1840, when the tipple was carried away by high water and ice.

It was afterwards leased to Samuel Hamilton who in 1842 built a new incline road and a slide tipple. He operated until 1846, and it passed into possession of Abraham Gallatin, Jr., who operated until 1847, which terminated the operations of this mine.

An area of thirty acres was mined out and the coal was run to the river trade.

137. JOHN NEEL MINE, (14 $\frac{7}{8}$ miles from Pittsburgh.)

Located on the west side of the river, opposite McKeesport.

Opened in 1844 by John, William and Harvey Neel. They operated until 1859, when Harvey died in Vicksburg with the yellow fever. William Neel continued to operate the mine until it was abandoned in 1876.

An area of 200 acres mined out.

138. DUNSHEE MINE, (14 $\frac{1}{8}$ miles from Pittsburgh.)

Located on the west side of the river, opposite McKeesport.

Opened in 1835 by Thomas Dunshee under lease from Colonel John Neel. He built a slide tipple, gravity plane and check house, and operated until 1842. He was succeeded by William Dunshee who operated until the place was abandoned in the spring of 1846.

About 30 acres have been mined out.

139. WHIGHAM MINE, (14 $\frac{3}{8}$ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1860 by William and James Whigham and Victor McElhaney under lease from Colonel John Neel and wife.

Mrs. Neel owned one hundred acres of coal extending back from the crest of the hill and Colonel Neel owned the front between that line and the river.

Whigham, McElhaney & Co. built a slide tippie, gravity plane and check house, operated until the time of Mrs. Neel's decease, in 1865, and William Neel bought the property. It was operated by J. S. Neel & Co. until 1873; then by Wm. Neel and Wm. Oliver until Oliver's death in 1875.

It remained idle for one year, after which Wm. Neel operated it until his decease in 1880. Then Harvey Hutchinson leased the mine and operated until the balance of the coal was exhausted in 1883.

An area of 250 acres has been mined out at this place.

140. COLLINS MINE, (14 $\frac{1}{2}$ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1835 by David Collins, under lease from Col. John Neel.

He built a slide tippie, gravity plane and check house, and operated until 1848, and was succeeded by Altmyer & Co., who operated until 1851; and they in turn were succeeded by Houser & Snyder, who operated until the mine was abandoned in 1856.

141. CRAWFORD MINE, (14 miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1836 by James Merrington, who operated until 1843, and was succeeded by Harmon West. He operated until 1855, and was succeeded by Mr. J. S. Neel, who operated under lease until the coal was exhausted in 1867.

About 100 acres mined out at this place.

142. JAMES NEEL MINE, (13½ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1838 by James and John Neel, in coal belonging to their father, Archibald Neel.

They built a slide tipple, gravity plane and check house, mainly out of hickory and white-oak timber hewn on the ground. They operated and run coal to the river trade until the property was exhausted in 1848, when the mine was abandoned.

An area of about 25 acres was mined out.

143. McCLOSKEY MINE, (12½ miles from Pittsburgh.)

Located at the upper end of Saltsburg, on the east side of the river.

Opened in 1835 by Patrick McClosky, who built slide tipple, gravity plane and check house, and run coal to the river trade.

He was succeeded by his son John McClosky, who operated until the coal was exhausted in 1846, and sold the lease to W. H. Brown. It is reported that the first upright check wheel known to be used on the river was erected at this place.

144. SALTWORKS MINE, (12¾ miles from Pittsburgh.)

Located at Saltsburg, on the east side of the river.

Opened by Hiram Neel under lease from Isaac Gill.

The coal was used in the manufacture of salt for a number of years, from which circumstance the town derived the name of Saltsburg.

It was sold to Moses Corry in 1854, who operated and sold it to J. B. Corry, David and Correlius Shaw, who also operated and sold it to Wm. H. Brown.

The balance of the coal was run out through the Keystone mine.

145. KEYSTONE MINE, (12½ miles from Pittsburgh.)

Located at the lower end of Saltsburg, on the east side of the river.

Opened in 1852 by Moses Corry. He sold it to Thomas Jones & Brothers in 1853. They operated to the river trade until 1864, and sold it to William H. Brown, who operated until his decease in 1875.

Since that time it has been operated by his heirs, Capt. Samuel S. Brown and brothers.

The coal is screened at the check house and run down a gravity plane in tram-wagons to a slide tipple at the river.

146. CORRY MINE, (12¼ miles from Pittsburgh.)

Located on the east side of the river.

Opened in 1843 by Moses Corry. He operated until 1845, when operations ceased by reason of a fall of the entry roof.

147. SHAW MINE, (12 miles from Pittsburgh.)

Located on the east side of the river.

Opened by Hiram Neel in 1833; after which it was operated successively by Patrick McClosky, Moses Corry, David Shaw and Thomas Jones & Co. The last named parties worked out the remaining portion of the coal in 1852.

148. PORT-PERRY MINE, (11½ miles from Pittsburgh.)

Located on the east side of the river.

Opened in 1838 by Col. Wm. L. Miller and Daniel C. Eaton. They operated for several years, and sold to Herron, Brown & Co. They operated one year and Brown sold his interest to W. J. Morrison. Herron and Morrison sold to John and James McClosky. They operated and sold to McClosky, Cosgrave & Co., in 1858, after which it

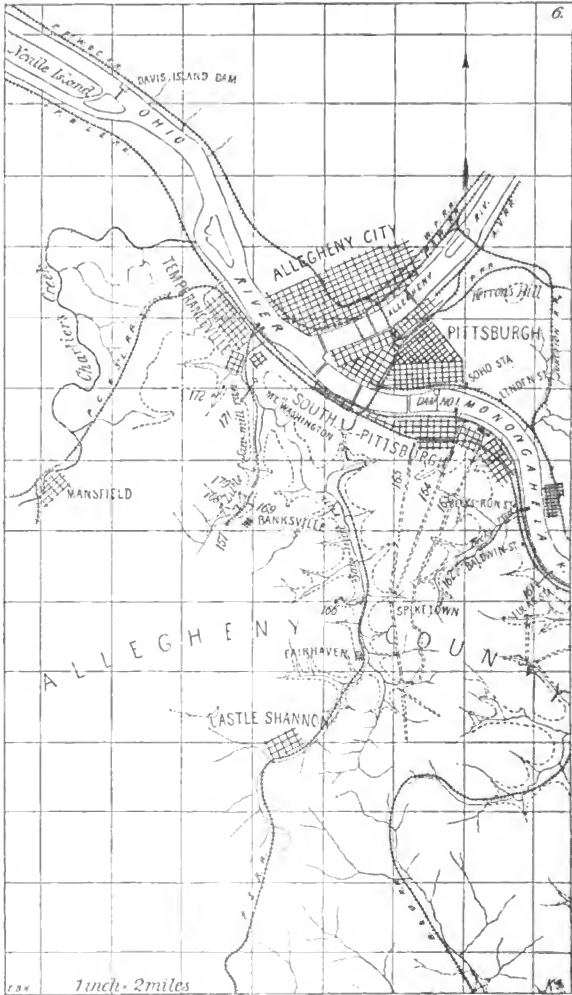
was operated by John McClosky until sold to William H. Brown.

149. MILLER MINE, (11½ miles from Pittsburgh.)

Located on the east side of the river, one fourth of a mile above Lock No. 2.

Opened in 1830 by — McGraw under lease from Wm. L. Miller. He operated to the river trade and was succeeded by Patrick McClosky, Noble & McTurk, and James O'Neil. O'Neil operated from 1843 to 1845. Then Thomas Jones & Co. operated from 1847 to 1853, when the mine was worked out.

The area mined out amounted to 25 acres.



CHAPTER VII.

Coal Mines in Pool No. 1.

150. TURTLE CREEK MINE, (11 miles from Pittsburgh.)

Located at the point of the hill at upper side of Turtle creek.

Opened in 1844 by Daniel C. Eaton, John Gilmore and Samuel Lewis, under lease from Wm. L. Miller.

They operated two years and sold their lease to Davidson Herron and Wm. H. Brown, who also bought the coal from Miller. They leased the mine to D. Herron, John Peterson and D. Cain, who operated until the coal was exhausted in 1853.

The area mined out amounted to 40 acres.

151. JOHN ROBISON MINE, (10½ miles south of Pittsburgh.)

Located on the east side of the river, a short distance below the mouth of Turtle creek. Was opened in 1846 by John Robison. He operated to the river trade until the coal was exhausted.

152. KENNY MINE, (9½ miles from Pittsburgh.)

Located on the west side of the river.

Originally opened in 1835, by Robert McClure under a lease from Thomas Kenny.

(159 K⁺)

McClure operated to the river trade until 1843, and was succeeded by the owner, Thomas Kenny, who operated the mine until 1845; at which time he opened another mine on the same property, a short distance up the river from the old mine.

He built a tippie, gravity plane and check house, and run the product of the mine to the river trade until the coal was exhausted, in 1876.

The tippie is now being used by the P. V. & C. Railroad Company for transporting coke and anthracite coal from their cars to boats in the river.

153. GREENSPRINGS MINE, (9 miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1840 by Alexander McClure under lease from Thomas West.

McClure built a slide tippie and gravity plane, and operated to the river trade for several years. Then Thomas West operated the mine until it passed into the possession of Matthew Hainan and William Redman, who operated until 1866, when Hainan died, and his interest was purchased by H. B. Hays.

It continued to be operated by Redman and Hays until 1875, after this by William Redman and Thomas Fawcett until 1877, when Redman sold his interest to Fawcett the present owner and operator. The present tippie was built during the summer of 1875 by Redman and Fawcett.

An area of 256 acres has been mined out, and 21 acres remain unmined. The elevation of the coal bed above low water is reported to be 390 feet.

The present workings are in the third hill, a distance of 2966 yards from the river.

A stationary engine is located at the front pit mouth on the river side of the first hill, which by means of a wire rope is used to haul the coal from a point at the bull wheel, 300 yards inside of the third hill, to, and through tunnels in the second and first hills, to the front pit mouth a total

distance of 2700 yards; and from the last named point it passes down a gravity plane, of 266 yards in length, to the river.

The mine is ventilated by the use of the exhaust steam from a pump, located near the head of the main entry, which is used to pump the water that collects in the swamp, from the mine. This swamp is $7\frac{1}{2}$ feet in depth and 200 yards in width, and bears S. 20° W.

The following columnar section was obtained at the pit mouth:

	Sandstone.			
	Sandy shale,	8'	0"	
	Gray sandstone,	5	0	
	Carbonaceous shale,	3	0	
<i>Greensprings mine</i> <i>Section No. 1.</i> <i>(Fig. 59.)</i>	}	Coal,	0 6	
		Clay,	0 2	
		Coal,	0 6	
		Parting,	0 $\frac{1}{2}$	
		Coal,	0 5	
		Clay,	0 10	
		Coal,	0 6	
		Parting,	0 $\frac{1}{2}$	
		Coal,	0 2 $\frac{1}{2}$	
		Parting,	0 $\frac{1}{2}$	
		Coal,	0 5	
		Parting,	0 $\frac{1}{2}$	
		Coal,	0 4 $\frac{1}{2}$	
		"a" Clay,	0 2	
		Coal,	0 7	
		Parting,	0 $\frac{1}{2}$	
		Coal,	0 1	
		} Little roof coal.	Parting,	0 $\frac{1}{2}$
			Coal,	0 2
			Main over-clay,	0 10
			Breast coal,	3 2
			Parting,	0 $\frac{1}{2}$
			Bearing-in coal,	0 4 $\frac{1}{2}$
			Parting,	0 $\frac{1}{2}$
			Brick coal,	0 9
	Parting,	0 $\frac{1}{2}$		
	Bottom coal,	1 4		
	Under-clay.			

This shows the usual increase in thickness of the coal members in the swamps, as has already been noticed in many other mines of the district.

No *clay veins* were observed, and only one small *spar* is reported in 111 acres of this mine so far as developed.

Horsebacks are quite numerous in the roof coal members at the point "a" in the section. They measure from one to eighteen inches in thickness, and from one to thirty feet in width, and the underlying coal members are usually depressed from one to six inches.

The main over-clay is quite uniform in thickness throughout the mine, and free from horsebacks.

The bottom coal member is not mined out of the rooms.

The following section of the main coal members was obtained in the swamp:

Greensprings mine Section No. 2.	{	Main over-clay,	0' 10"
		Breast coal,	3 5½
		Parting,	0 ½
		Bearing-in coal,	0 4
		Parting,	0 ½
		Brick coal,	1 0
		Parting,	0 ½
		Bottom coal,	1 8

Cleavage plane bearings were obtained, as follows:

N. 62¼ W. 6 feet	—N. 62° W. 3 feet.
N. 62 W. 8 "	—N. 68½ W. 3 "
N. 67½ W. 8 "	—N. 63¼ W. 3 "
N. 66½ W. 7 "	—N. 66½ W. 4 "
N. 67¼ W. 6 "	—N. 64 W. 5 "

They are only making two grades of coal at this mine at present, *lump* and *slack*, in the proportions of 80 per cent. of lump to 20 per cent. of slack.

120 miners, 9 drivers and 14 day men are employed, and the output averages 11,000 bushels of lump coal per day.

154. BRADDOCK MINE, (8½ miles from Pittsburgh.)

Located on the east side of the river, near the town of Braddock.

Opened by James Corry & Co. in 1872. They built a gravity plane from the pit mouth to the Pennsylvania railroad, and shipped the entire product of the mine by rail. The coal has been exhausted and the mine is not in operation.

155. BELLWOOD MINE, (8 $\frac{2}{10}$ miles from Pittsburgh.)

Located on the west side of the river, a short distance above Munhall Station on the P. V. and C. Railroad.

Opened in 1882 by William, Michael and John Munhall, the present owners and operators. They built an abutment tipple and an outside road, 2 $\frac{1}{4}$ miles in length, up Whiteacre run to the pit mouth, over which the coal is hauled by a steam locomotive from the mine to the river. The locomotive makes a round trip in thirty minutes, and hauls fifty cars at a trip.

The coal is screened at the river into two grades at present, lump and slack. The lump coal after passing over the screen runs into the weigh pan, and the weight recorded on the weigh sheet, after which the pan is lowered by a drum wheel to a barge or boat on the river side of the outer abutment. The slack coal is run backwards, through sheet iron shutes, to a boat for its reception in the slough between the shore and river abutment.

The weigh sheet shows the cars to contain from 26 to 34 bushels each, averaging about 30 bushels of lump coal per car. They report the run of the mine to yield 75 per cent. of lump coal and 25 per cent. of slack.

140 miners, 7 drivers, 2 day men at the mines, and 13 on the road and at the tipple are employed; and the output averages 10,000 bushels of lump coal per day.

The mine is worked under the single entry system. The main entry is driven on a bearing of S. 36 $\frac{1}{2}$ ° W. The butt entries are driven singly and 165 yards apart. Shallow shafts are sunk at the head of each butt entry, which provides very good natural ventilation to the workings.

Horsebacks in the over-clay, *clay veins* and *spars* are quite numerous. The upper surface of the breast coal was observed to be wavy or undulating in a large portion of the mine, and usually depressed from three to four inches under horsebacks. One horseback was observed that measured three feet in thickness and twenty feet in width. They usually terminate at the top in a well defined obtuse line running parallel with their major axis. The bearing of the axis of two of them was found to be S. 40° E.

The following columnar section was obtained at a point where the roof had fallen in Entry No. 5:

	Carbonaceous shale.	
<i>Bellwood mine</i> <i>Section.</i> <i>(Fig. 60.)</i>	Coal,	0' 2''
	Parting,	0 ¼
	Coal,	0 2
	Clay parting,	0 1
	Coal,	0 2
	Parting,	0 ¼
	Coal,	0 1
	Clay parting,	1 2
	Coal,	0 5
	Parting,	0 ½
	Coal,	0 4½
	Parting,	0 ½
	Coal,	0 3½
	Clay parting,	0 2½
	Coal,	0 6
	Parting,	0 ½
	Coal,	0 1
	Parting,	0 ½
	Coal,	0 2
	Main over-clay,	from 4' to 0 8
Breast coal,	3 2	
Parting,	0 ¼	
Bearing-in coal,	0 5	
Parting,	0 ¼	
Brick coal,	0 10	
Parting,	0 ¼	
Bottom coal,	1 1½	
	Under-clay.	

The following *cleavage bearings* were obtained in different parts of the mine:

N. 63½	W. 4 feet	—N. 61	W. 4 feet.
N. 61½	W. 6 "	—N. 63	W. 3 "
N. 62½	W. 6 "	—N. 64½	W. 5 "

156. BROWN MINE, (6½ miles from Pittsburgh.)

Located on the east side of the river near Logtown, now called Brown Station.

Opened by Wm. H. Brown in 1848. He constructed a slide tippie, gravity plane and check house, and run coal to the river trade until the mine was exhausted, about the time of his death in 1875.

157. HODGSON MINE, (5½ miles from Pittsburgh.)

Located at Logtown now called Brown Station on the east side of the river.

Opened in 1843 by Daniel Bushnell and Wm. Munson. It is said that they constructed the improvements, consisting of a slide tippie, gravity plane and check house, mainly out of sugar timber growing in the vicinity of the mine.

They operated to the river trade, and were succeeded by William Hodgson, who operated until 1850, when the property was sold to Wm. H. Brown.

He built a new road, about 500 yards up the river from the old one, and mined out the remainder of the coal contained in the property.

158. BUSHNELL MINE, (5½ miles from Pittsburgh.)

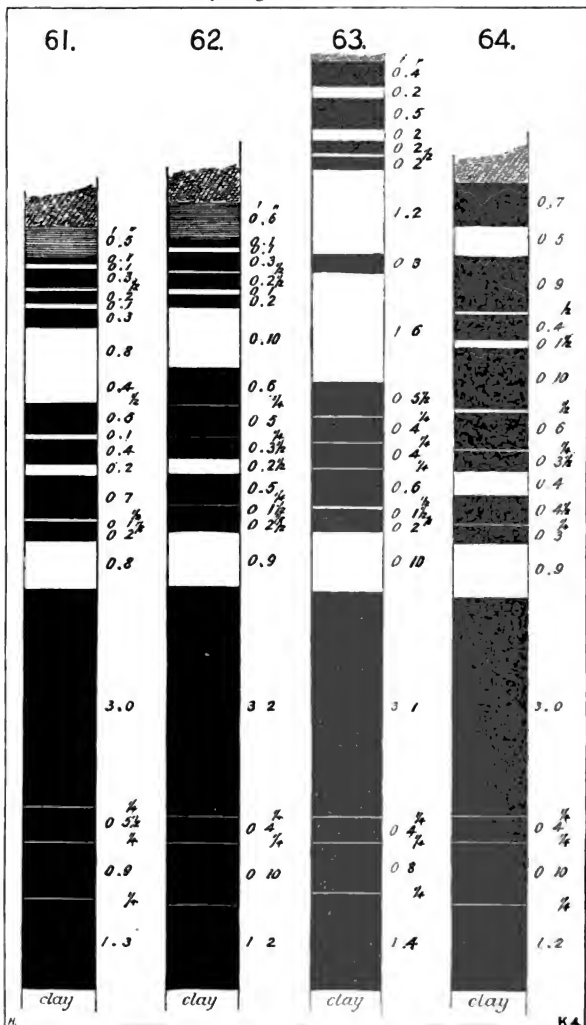
Located on the west side of the river.

Opened by Daniel Bushnell in 1840. The tippie house stood about 100 yards above the mouth of Street's run, and the pit mouth was located on the east side of that run three fourths of a mile from the river.

A gravity plane was built from the pit mouth to the run bed, and from there a road was constructed, with wooden rails surfaced with strap iron, to the tippie at the river.

The Baltimore and Ohio railroad now occupies a portion this old road bed.

Bushnell run coal at this place to the river trade until 1861, at which time the property passed back into the hands of Daniel Risher, the previous owner, and no coal has been taken from this mine since then.



159. HAY'S STREET'S RUN MINES, (5* miles from Pittsburgh.)

Located on and near Street's run.

The first of these mines was opened by James Hays in 1842, in what was known as the David Calhoun coal, at a point a short distance above the mouth of the run.

He built a tippie and gravity plane to the pit mouth on the face of the hill fronting the river, and operated until he sold it to George Lysle, who operated until the coal was exhausted.

James Hays also opened a mine in the point of the hill on the south side of Glass run, which empties into Street's run, at a point about one fourth of a mile from the river. He built a check house, gravity plane to the run bed, a road and a tippie. The coal was hauled to the river by horses. This mine has been abandoned for a number of years.

He opened the present mine in 1871, on the east side of Street's run at a point one and three fourths miles from the river, and operated until his decease in 1876 ; after which it was operated by his sons Henry B. and John S. Hays until their decease, and since February, 1883, it has been operated by Harry Bughman as trustee for the Hays estate.

The coal is hauled from the workings to the check house, from where it passes down a gravity plane to the base of the hill, and from there it is hauled to the tippie at the river, by a steam locomotive.

220 miners, 14 drivers, 8 day men at the mine, 8 day men at the river, and 17 mules are employed, and the output amounts to 15,000 bushels per day.

The coal bed here dips towards the south, and the water that collects in the low parts of the mine is drawn out by means of a *steam pump*, located near the pit mouth, through a four inch pipe, 400 yards in length. The pump has a four inch suction and a three inch discharge, and is run about two hours per day. The fall from pit mouth to inner end of pipe is twelve feet.

*The distance given south from Pittsburgh by water or up the Monongahela river is computed in each case from the Smithfield Street Bridge, at Pittsburgh.

The following columnar section was obtained:

Carbonaceous shale.	
<i>Hays' Street's Run mine Section. (Fig. 61.)</i>	Block slate, 0' 5"
	Coal, 0 1
	Clay, 0 1
	Coal, 0 3
	Parting, 0 ½
	Coal, 0 2
	Clay, 0 1
	Coal, 0 3
	Clay, 0 8
	Coal, 0 4
	Parting, 0 ½
	Coal, 0 5
	Parting, 0 1
	Coal, 0 4
	Clay, 0 2
	Coal, 0 7
	Parting, 0 ½
	Coal, 0 1
	Parting, 0 ½
	Coal, 0 2
	Main over-clay, 0 8
	Breast coal, 3 0
	Parting, 0 ½
	Bearing-in coal, 0 5½
	Parting, 0 ½
	Brick coal, 0 9
	Parting, 0 ½
	Bottom coal, 1 3
Under-clay.	

Cleavage plane bearings were obtained as follows:

N. 66½ W. 4 feet—	N. 63¾ W. 5 feet.
N. 63 W. 4 " —	N. 62¼ W. 5 "
N. 66 W. 6 " —	N. 65 W. 7 "

160. RISHIER MINES, (4½ miles from Pittsburgh.)

Located on the west side of the river.

The present tippie is located on the site of the old one, about 500 yards below the mouth of Street's run.

The first of these mines was opened in 1859 by Daniel Risher, in what was known as the "Black coal," on the east side of Street's run, at a point 1½ miles from the river.

He operated here until January 1st, 1863, when he leased the coal and road to his son Ithamar D. Risher, and retired

from the business. I. D. Risher mined out the remaining portion of the "Black" coal, amounting to forty acres, and in 1865, he extended the road and opened a mine in the "Montooth" coal on the west side of the run, at a point two miles from the river.

He built a check house gravity plane, and hauled the coal to the river, by a steam locomotive. About fifty acres were mined out at this place.

In 1868, the road was again extended one eighth of a mile farther up the run, to the "Willett" coal, on the same side of the run. He mined out 40 acres at this place and abandoned it in 1872. During the last-named year he opened a mine in "Hamilton" coal, under lease from Daniel Risher, located on Irwin's branch of Street's run. He also now owns the Miller and Irwin tracts of coal adjoining the Hamilton tract.

The columnar section is as follows :

Carbonaceous shale.	
	Block slate, 0' 6"
	Coal, 0 1
	Clay parting, 0 1
	Coal, 0 3
	Clay parting, 0 ½
	Coal, 0 2½
	Clay parting, 0 1
	Coal, 0 2
	Clay parting, 0 10
	Coal, 0 6
	Parting, 0 ½
	Coal, 0 5
	Parting, 0 ½
	Coal, 0 3½
	Clay parting, 0 2½
	Coal, 0 5
	Parting, 0 ½
	Coal, 0 1½
	Parting, 0 ½
	Coal, 0 2½
	Main over-clay, 0 9
	Breast coal, 3 2
	Parting, 0 ½
	Bearing-in coal, 0 4
	Parting, 0 ½
	Brick coal, 0 10
	Parting, 0 ½
	Bottom coal, 1 2
	Under-clay.

*Risher mine
Section.
(Fig. 62.)*

Cleavage planes were found to bear as follows:

N. 61 W. 3 feet—N. 61 $\frac{1}{2}$ W. 4 feet.

N. 62 $\frac{1}{2}$ W. 3 " —N. 61 W. 3 "

N. 56 $\frac{1}{2}$ W. 4 " —N. 63 $\frac{1}{2}$ W. 4 "

The coal is hauled from the mine to the check house, on the face of the hill, by mules; from which point it passes down a gravity plane to the foot of the hill, and from there it is run by a stationary engine and wire rope to the locomotive road, at the junction of the two runs. It is then hauled to the river by a steam locomotive.

125 miners, 10 drivers, 1 trapper and 20 day men are employed, and the output averages 10,500 bushels of lump coal per day.

The *ventilation* is produced by furnace power. The stack and shaft is 80 feet in height.

161. WALTON'S POOL No. 1 MINE, (4 $\frac{1}{2}$ miles from Pittsburgh.)

Located on the west side of the river.

Opened in 1825 by Peter Shoenberger. He drove a tunnel through the front hill, and used the coal for fuel at his rolling mill at Bayardstown, now a part of Pittsburgh.

It was leased to James Hays in 1828, who operated and purchased the property in 1858. He continued to operate until 1863, and leased to the present operators, Joseph Walton and Peter Haberman.

The coal is hauled from a point in the second hill to the front pit mouth, a distance of 2400 yards, by means of a *stationary engine* and wire line; the engine being located near the front pit mouth. The cars are run in trains of 46 cars to each train, and make a round trip in 20 minutes.

The *electric telephone* is used for communication between the engineer and the parting, at the end of the dilly road, in the mine.

The cars are run from the check house at the front pit mouth down a gravity plane to the tippie at the river.

This mine has been operated principally on the single

entry system. They have however recently commenced to drive the butt entries double. These entries are generally driven to the outcrop, which gives a fair amount of air current without the use of a fan or furnace.

200 miners, 16 drivers, 14 day men at the mine, and 7 at the river are employed, and the output averages 16,500 bushels of lump coal per day.

Clay veins and *spars* are quite numerous.

The following columnar section was obtained :

	Sandstone shale.		
	Carbonaceous shale, . . . . .	.5'	0"
	Block slate, . . . . .	.0	6
	Carbonaceous shale, . . . . .	.0	6
Walton's Pool No. 1 mine Section (Fig. 63.)	{	Coal, . . . . .	.0 4
		Clay, . . . . .	.0 2
		Coal, . . . . .	.0 5
		Clay, . . . . .	.0 2
		Coal, . . . . .	.0 2
		Clay, . . . . .	.0 ½
		Coal, . . . . .	.0 2
		Clay, . . . . .	.1 2
		Coal, . . . . .	.0 3
		Clay, from 1' 0" to 2	0
		Coal, . . . . .	.0 5½
		Parting, . . . . .	.0 ½
		Coal, . . . . .	.0 4
		Parting, . . . . .	.0 ½
		Coal, . . . . .	.0 4
		Parting, . . . . .	.0 ½
		Coal, . . . . .	.0 6
		Clay, . . . . .	.0 ½
		Coal, . . . . .	.0 1½
		Parting, . . . . .	.0 ½
Coal, . . . . .	.0 2		
<i>Main over-clay</i>, . . . . .	.0 10		
Breast coal, . . . . .	.3 1		
Parting, . . . . .	.0 ½		
Bearing-in coal, . . . . .	.0 4		
Parting, . . . . .	.0 ½		
Brick coal, . . . . .	.0 8		
Parting, . . . . .	.0 ½		
Bottom coal, . . . . .	.1 4		
	Under-clay.		

Cleavage bearings were obtained as follows :

N. 68° W. 6 feet—N. 67½ W. 6 feet.

N. 60 W. 3 " —N. 65 W. 4 "

162. BECK'S RUN MINES, (3 $\frac{3}{8}$ miles from Pittsburgh.)

Located on the west side of the river.

James Hays opened a mine on the west side of the run a half mile from the river in 1858. He built a tippie and gravity plane and operated until 1862; and leased the mine to N. J. Bigley. He operated until the coal was exhausted.

The tippie was located about 200 yards below where the present one stands. It was destroyed by high-water and ice during the spring of 1867.

The full cars were run from the foot of the incline plane to the river by gravity, and the empty ones were hauled back by mules.

James Hays also opened another mine on the east side of the run, one third of a mile from the river, built a gravity plane, road and tippie. The tippie was located about 200 yards up the river from the present one. The coal was hauled from the foot of the incline or gravity plane to the river by mules.

He leased the mine to Robert and James Watson, who operated until 1869, and nothing has been done at this place since that time. The area mined out amounts to 90 acres.

The present mine was opened by James Hays in 1869. He built a tippie gravity plane, check house, lower and upper locomotive roads, and operated until his decease in 1876; after which it was operated by his sons Henry B. and John S. Hays until their decease, and since February, 1883, it has been operated under the direction of Harry Bughman, trustee of the Hays estate.

The coal is now hauled by *locomotive power* from the workings in the second hill, through a tunnel in the first hill, to the check house at the top of the gravity plane, a distance of one and a quarter miles. It then passes down the gravity plane to the base of the hill, from whence it is hauled to the river by another locomotive an additional distance of one mile. The last named locomotive hauls 20 cars at a trip.

The mine is worked on single entry system. The main entry is driven on a bearing of S. 25° W. The butt entries

are driven single, $7\frac{1}{2}$ feet wide and 160 yards apart. Butt entry No. 3 is driven 1750 yards; No. 4, 1850 yards and No. 5, 1000 yards.

The air courses are driven across, and perpendicular to the butt entries, at intervals of 200 yards. The gauge of pit track is 3 feet $5\frac{1}{2}$ inches, and the weight of "T" iron pit rails is from 16 to 20 pounds per yard. They use 40 pound "T" iron on the locomotive road. Five miles of "T" iron rails have been laid and are in use at this mine.

The following columnar section was obtained at the furnace:

	Carbonaceous shale.		
<i>Beck's Run mine</i> <i>Section.</i> <i>(Fig. 64.)</i>	}	Coal,	0' 7"
		Clay,	0 5
		Coal,	0 9
		Clay,	0 $\frac{1}{2}$
		Coal,	0 4
		Clay,	0 $1\frac{1}{2}$
		Coal,	0 10
		Clay,	0 $\frac{1}{2}$
		Coal,	0 6
		Parting,	0 $\frac{1}{2}$
		Coal,	0 $3\frac{1}{2}$
		Clay,	0 4
		Coal,	0 $4\frac{1}{2}$
		Parting,	0 $\frac{1}{2}$
		Coal,	0 8
		Main over-clay,	0 9
		Breast coal,	3 0
		Parting,	0 $\frac{1}{2}$
		Bearing-in coal,	0 4
		Parting,	0 $\frac{1}{2}$
Brick coal,	0 10		
Parting,	0 $\frac{1}{2}$		
Bottom coal,	1 2		
	Under-clay.		

Cleavage bearings were obtained as follows:

N. $69\frac{1}{2}$ W. 3 feet—N. $63\frac{1}{2}$ W. 3 feet.

N. 63 W. 4 " —N. $63\frac{3}{4}$ W. 5 "

N. $69\frac{3}{4}$ W. 5 " —N. $69\frac{1}{2}$ W. 6 "

The *ventilation* is produced by furnace power. The furnace is located on No. 4 butt entry, 1000 yards from its mouth. It is 20 feet in length, 5 feet in width, $6\frac{1}{2}$ feet in height above the floor, and connected with a shaft and stack 105 feet in height. It is built in the arch form, with

two courses of common brick, and lined on the inside with one course of fire brick. The fire bed is formed of one set of patent shaker grate bars 5 feet in length. Another furnace is located at a point on the main entry, 435 yards from the pit mouth. It is connected with a shaft and stack 83 feet in height, and is used principally to remove the locomotive smoke from the mine.

190 miners, 13 drivers, 1 trapper, 1 furnace tender, 14 day men and 1 engineer and fireman on each locomotive; and the daily output is 12,000 bushels of lump coal.

Peter Troutman is general superintendent, and Julius C. Esmiol is mine boss.

163. AMERICAN MINE.

Located at Ormsby now South Pittsburgh.

Opened in 1854 by Jones and Laughlin, for the use of the American Iron and Steel Works, owned and operated by them.

The head of the present workings is about four miles from the river. The coal is hauled from the workings by mules, to the entrance of the fourth hill, a distance of 3000 yards, and from that point it is hauled by a steam locomotive, through three hills, to the check house at the front pit mouth a distance of one and a half miles, from whence it passes down a gravity plane 1300 feet in length to the base of the hill, and thence to the iron and steel works before mentioned.

90 miners, 12 drivers and 30 day men are employed at this mine, and the output averages from eight to nine thousand bushels of lump coal per day.

The area mined out is about 330 acres.

Cleavage bearings were obtained as follows:

N. 64 $\frac{1}{2}$ W. 4 feet	—N. 66 W. 2 feet.
N. 60 W. 3 "	—N. 62 W. 4 "
N. 60 $\frac{1}{2}$ W. 2 "	—N. 63 W. 5 "
N. 66 $\frac{1}{2}$ W. 3 "	—N. 62 $\frac{3}{4}$ W. 4 "
N. 65 $\frac{3}{4}$ W. 6 "	—N. 63 W. 4 "
N. 61 W. 3 "	—N. 67 $\frac{1}{4}$ W. 2 "
N. 64 $\frac{3}{4}$ W. 6 "	—N. 62 $\frac{1}{2}$ W. 5 "
N. 67 W. 3 "	—N. 64 W. 4 "

164. ORMSBY MINE.

Located at Twenty-first street, Birmingham, now South Pittsburgh.

Opened in 1838 by John H. Page and Captain Phillips.

They built a tippie, a road along the line of Twenty-first street to the base of the hill, a gravity plane and check house, and operated to the river trade until 1844. It then remained idle until 1846, and passed into possession of George Leadley. He operated until 1851, and was succeeded by Dr. Oliver Ormsby, who operated in a small way until 1861.

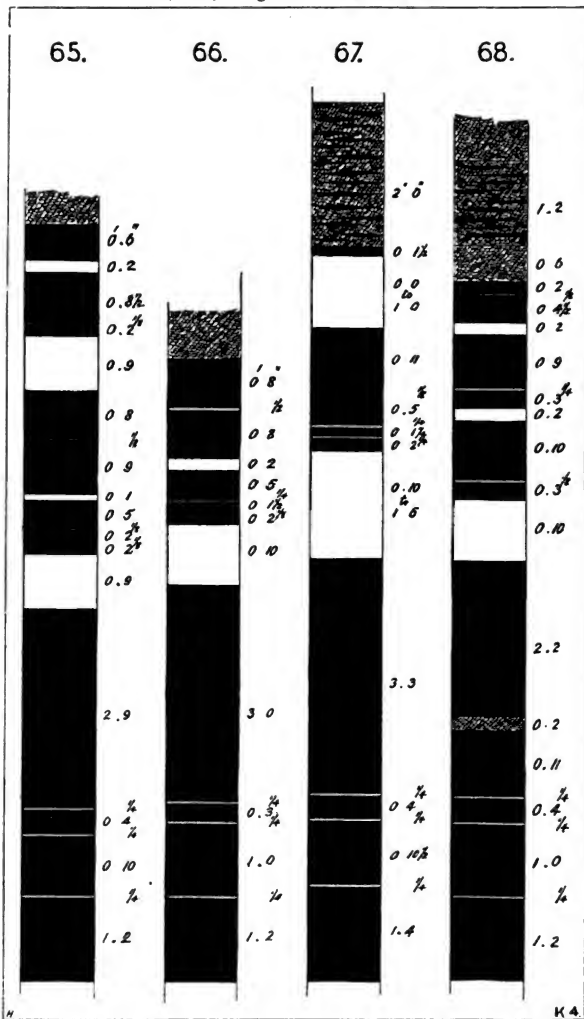
It was then leased by Keeling, Smith & Co., who operated until May, 1878, when it was leased by the Birmingham Coal Company (Limited) who still continue as operators.

They exhausted the remaining coal from the front hill and extended the main tunnel to the outlet at Spiketown, a distance of 3300 yards from the front pit mouth. This is also the place where the main tunnel of the Bausman mine comes out to the surface.

The coal intended for the river trade is hauled from this point by a stationary engine located at the front pit mouth. Another stationary engine is located at this place, which hauls the coal from both mines through tunnels in the second and third hills, a distance of 2600 yards, and from the head of the present workings, in the fourth hill, an additional distance of 800 yards.

The coal is screened at the check house, near the front pit mouth, into iron tram-wagons having two compartments, one for holding the lump coal, and the other for holding the slack coal. These cars or wagons run down the gravity plane to a point near the foot of the hill, where a knocker unloads the dust coal at the coke yard, and the wagon passes on a little farther to the first tippie, where the lump coal is unloaded into cars holding about fifty bushels each. These cars are hauled to the river tippie by a locomotive engine.

The river tippie is so constructed that the cars can be lowered perpendicularly to the boats underneath, by means of self-acting cages balanced by back-weights. Two of



these cages are used alternately, enabling them to handle a large amount of coal, with comparatively great ease, at almost any ordinary stage of water. The slack coal is made into coke.

The present workings of the Ormsby and Bausman mines are contiguous; the entries of one connect with the entries of the other, and both are worked on the double entry system.

170 miners, 12 drivers, 6 day men, 25 boys and 12 mules are employed at this mine, and the output averages about 13,000 bushels of lump coal per day.

They have recently put in place a *steam fan* manufactured by Crawford & McCrimmon of Brazil, Indiana, but no information has yet been received as to its performance.

The following columnar section was obtained:

	Sandstone,	20	0"
	Carbonaceous shale,	from 6'	to 12
	Coal,	0	6
	Clay,	0	2
	Coal,	0	8½
	Parting,	0	½
	Coal,	0	2
	Clay,	0	9
	Coal,	0	8
	Parting,	0	½
	Coal,	0	9
	Clay,	from 0'	½" to 0
	Coal,	0	5
	Parting,	0	½
	Coal,	0	2
	Parting,	0	½
	Coal,	0	2
	Main over-clay,	0	9
	Breast coal,	2	9
	Parting,	0	½
	Bearing-in coal,	0	4
	Parting,	0	½
	Brick coal,	0	10
	Parting,	0	½
	Bottom coal,	1	2
	Under-clay.		

Ormsby mine
Section.
(Fig. 65.)

The carbonaceous shale averages 12 feet in thickness in the Bausman mine.

Cleavage plane bearings were obtained as follows :

N. $63\frac{1}{2}$ W. 3 feet—N. $66\frac{1}{2}$ W. 4 feet.
 N. 61 W. 3 " —N. $60\frac{1}{2}$ W. 4 "
 N. $64\frac{1}{2}$ W. 8 " —N. $64\frac{1}{2}$ W. 5 "

165. BAUSMAN MINE.

Located at Twelfth street, Birmingham, now South Pittsburgh.

Opened by Frederick Bausman in 1844. He operated and supplied coal to the city trade until 1849, and leased the mine to Joseph Keeling, who operated until 1856; after which Bausman operated until 1865, and sold the mine to Joseph Keeling. He operated until May, 1878, when it became the property of the Birmingham Coal Company (Limited) composed of Joseph Keeling, John Spennweber and others, who continue as operators.

The main tunnel has been extended through the first hill to the outcrop at Spiketown, the place of connection with the Ormsby mine road. From this point the coal intended for the city trade is hauled through the tunnel to the front pit mouth by a steam locomotive, and from this point the cars of both mines are run by a *stationary engine* over one and the same road, to the inlet of the workings in the fourth hill, a distance of two miles. 56 cars are hauled from the mines at a trip.

The water collects mainly in the west part of the mine, and is pumped out through a perpendicular shaft 100 feet in depth.

They have one four-inch and two ten-inch *steam pumps* in place, but are only using the two large ones a portion of the time at present. The exhaust steam escapes into the bottom of the shaft, and thereby furnishes *ventilation* to the mine.

The *over-clay* is quite uniform in thickness throughout the mine, averaging about ten inches.

No *horsebacks* were observed, although a few small ones were reported. One *clay vein* three feet in thickness was

observed near the head of entry No. 10, which was reported to have given off some *carburetted hydrogen*, and some water while being cut through by the miners.

They employ at this mine 160 miners, 12 drivers, 6 day men, 25 boys and 15 mules.

The output averages about 12,000 bushels of lump coal per day.

The elevation of the coal at the river front, or Coal Hill, as reported by S. Diescher, Engineer of Pittsburgh, is 330 feet above low water, at points in Birmingham below Dam No. 1.

166. CASTLE-SHANNON MINES.

Located on Coal Hill (now Mt. Washington) in South Pittsburgh.

Originally opened in 1825 by Jacob Beltzhoover. The old entry is now used for the main tunnel of the Pittsburgh and Castle-Shannon railroad.

Jacob Beltzhoover operated and sold coal to the city trade until 1835, and was succeeded successively by John Griffith and John D. Miller. The property was sold to Bailey, McKain & Co., in 1856, and in 1859 it passed into the possession of James M. Bailey who operated and run out the remaining portion of the coal in the front hill in 1861, and sold to the Pittsburgh Coal Company.

They extended the road and opened a mine on the south side of Saw-mill run. The coal was run from the pit mouth down a chute to near the run bed, loaded into cars, that were hauled over the run on a trestle, and elevated to coal level on the north side by means of a *stationary engine*; and from thence they were hauled through the old tunnel by a *steam locomotive* to the front pit mouth, from where they passed down a gravity plane to the coal yard in South Pittsburgh.

They worked this place out in 1864, and opened a mine one half mile further up the run, adjoining the one last named, where they continued to operate until 1872, and

sold to the Pittsburgh and Castle-Shannon Railroad Company.

This company continued to operate the old mines, and open new ones, and commenced hauling passengers and coal over the new road in 1874; which they had by that time extended to Castle-Shannon, the present terminus of the road.

The present mine is located about three miles from the river. The coal is hauled from the mine to the check house by mules, from where it passes down a gravity plane to the tipple at the railroad, on the west side of Saw-mill run. Here it is screened into cars, about the size of the mine cars, and hauled in trains of 50 cars each, by locomotive power to the head of the gravity plane on the face of Coal Hill, fronting the river; from whence they pass down the incline or gravity plane to the coal yard at the Castle-Shannon railroad depot.

They employ 140 miners, 10 drivers, 4 inside day men and 10 day men outside, and are producing about 8000 bushels of lump coal per day.

The mine is worked on the single entry system, and the butt entries are driven 160 yards apart.

The coal bed dips to the west, south and east from a point on the main butt entry.

The following columnar section was obtained:

	Carbonaceous shale.	
Castle-Shannon mine Section. (Fig. 66.)	Coal,	0' 8"
	Parting,	0 ½
	Coal,	0 8
	Clay parting,	0 2
	Coal,	0 5
	Parting,	0 ½
	Coal,	0 1½
	Parting,	0 ½
	Coal,	0 2
	Main over-clay,	0 10
	Breast coal,	3 0
	Parting,	0 ½
	Bearing-in coal,	0 3
	Parting,	0 ½
	Brick coal,	1 0
Parting,	0 ½	
Bottom coal,	1 2	
	Under-clay.	

Horsebacks are not numerous in the main over-clay, but are most frequently found in the roof coal partings. A few *clay veins* were observed.

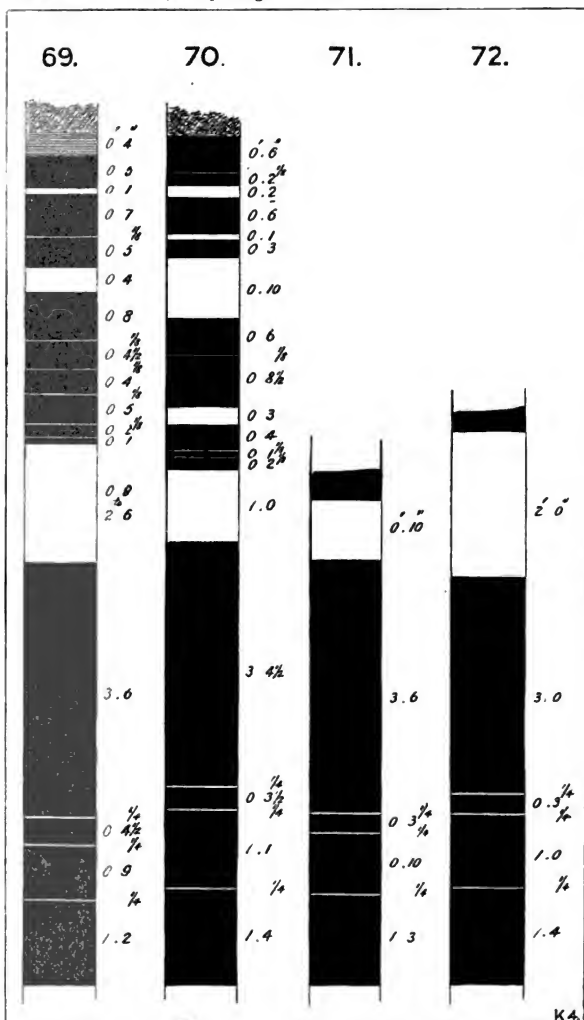
The following *cleavage bearings* were obtained:

N. $67\frac{1}{2}$ W. 3 feet—N. $66\frac{1}{4}$ W. 3 feet.

N. $66\frac{1}{4}$ W. 1 " —N. $65\frac{1}{2}$ W. 6 "

N. 66 W. 2 " —N. $65\frac{3}{4}$ W. 4 "

James M. Bailey is General Superintendent of the railroad and coal mines belonging to the company.



CHAPTER VIII.

Saw-Mill Run Mines.

167. ENTERPRISE MINE.

Located at Banksville, on Little Saw-Mill run, at the terminus of the Little Saw-Mill Run Railroad, three miles from the Ohio river by rail.

The mine was owned and opened up by the Little Saw-Mill Run Railroad and Coal Company in 1852 and '53. They operated until 1863, and leased the mine to Hartley and Marshall, who operated, and in 1870 purchased the remaining portion of the coal and improvements from the company, as well as other adjoining tracts of coal, which they still continue to operate.

An area of 427 acres has been mined out.

They employ 200 miners, 10 drivers and 22 day men, and the output averages about 1000 tons per day.

The main entry is driven on a bearing of S. 70° W. 1200 yards, then curves to the east for 300 yards, from which point it bears S. 26½° E. 1100 yards, to its head. It dips 60 feet from the pit mouth to the curve, then rises 24 feet to the head.

The empty cars run in to the inner end of the curve by gravity, carrying one end of the wire line with them. The line is then hooked on to a train of loaded cars that are hauled out by means of a *stationary engine* located near the pit mouth. The coal was formerly hauled from the head of the workings to the inner end of the curve by means of another stationary engine located at the last named point. This engine has recently been supplied by a *Tank-Locomotive Engine* of English manufacture. It runs on three

pair of wheels 20 inches in diameter. The cylinders are 6 inches in diameter; 12-inch stroke. Boiler to work to 250 lbs. per square inch steam pressure. Total height of engine is 4 feet 9 inches, and weighs about $4\frac{1}{2}$ tons. There is no special provision for consuming the smoke other than a small grate area, which is only $1\frac{7}{8}$ feet, which it is claimed secures a good combustion. It makes a round trip, of 1300 yards, in 20 minutes, with a train of from 25 to 30 cars.

The coal is screened near the pit mouth; and the portion intended for the river trade is run into four-wheeled dump cars, holding about five tons each, which are hauled by locomotive power over the line of the Little Saw-Mill Railroad to the tipple at the river, and loaded into boats; the portion intended for the railroad trade is run into the regular flat and gondola cars, and shipped to Youngstown, Ohio, and the Lake markets.

They use a traveling screen, by which they are able to make six grades of coal, viz: Lump or $1\frac{1}{2}$ -inch coal, $\frac{3}{4}$ -inch coal, run of mine, nut, slack, nut and slack mixed, and washed slack or blacksmith coal. They claim a great advantage, by being prepared to furnish so many different grades of coal to the varying demands of the trade.

The slack is cleaned from sulphur and slate by a *gravity washer*.

The coal run to the river was formerly shipped to the lower river markets, but for the last three years it has been sold to supply the local city trade. About one fourth of the product of the mine is disposed of in that way.

The pit cars used are of the box style; the bed being 6 feet 2 inches long, 4 feet wide, with perpendicular sides and ends 20 inches high, holding about 26 bushels level full. This bed or box is placed on a heavy wooden frame, and the wheels are underneath the bed, instead of at the sides. The gauge of track is two feet; the ties are sawed $3\frac{1}{2}$ feet in length, and 3 by 6 inches square, and the pit rails used are of steel weighing 25 lbs. per yard. Chain hitchings two feet in length are used.

The mine is ventilated by means of a *fan*, made on the Guibal plan, 15 feet in diameter, with blade surfaces 5 by



100110

LITTLE SAW MILL RUN RAILROAD COMPANY'S TIPPIL. SOUTH PITTSBURGH

ALLEN'S PRINTING CO

6 feet. The distance traveled by the air current from the inlet to the fan is $3\frac{5}{100}$ miles, and when the fan was moving at the rate of 65 revolutions per minute, the volume of air traveling at the fan was found by the anemometer to be 32,175 cubic feet per minute, the area of airway being 33 square feet.

They use a steam pump with a 15-inch cylinder to deliver the water from the mine.

A furnace has been erected near the boilers in the mine, which is used to keep the air moving through the workings during the night time, and to supply the place of the fan in case it could not be run, from any cause.

The following columnar section was obtained.

	Carbonaceous shale,		
	Block slate,	0' 6"	
	Carbonaceous shale,	1 0	
	Coal and shale mixed,	2 0	
Saw-Mill Run mines Section. (Fig. 67.)	}	Coal,	0 1½
		Clay,	from 0' to 1 0
		Coal,	0 11
		Parting,	0 ½
		Coal,	0 5
		Parting,	0 ½
		Coal,	0 1½
		Parting,	0 ½
		Coal,	0 2
		Main over-clay,	from 10' to 1 6
		Breast coal,	3 3
		Parting,	0 ½
		Bearing-in coal,	0 4
		Parting,	0 ½
		Brick coal,	0 10½
		Parting,	0 ½
Bottom coal,	1 4		
	Under-clay.		

Cleavage plane bearings were obtained as follows:

N. $66\frac{3}{4}^{\circ}$ W. 3 feet—N. $63\frac{3}{4}$ W. 2 feet.

N. 67 W. 3 " —N. $67\frac{1}{4}$ W. 3 "

N. $64\frac{1}{2}$ W. 6 " —N. 65 W. 4 "

Bottom of coal bed at pit mouth is reported to be 250 feet above low water of the river, and in the hill at the mouth of Saw-Mill Run it is reported at 350 feet above the same stage of water.

The river tipples are owned by the Little Saw-Mill Railroad Company, and toll is charged for all coal run over them. The first of these tipples was built in 1853, and located at a point about 200 yards below the mouth of the run. It was arranged for screening the coal as well as loading it into boats.

A new tipple was built in its stead in 1864, which was arranged for loading into boats only, the coal being then screened at the mines. It is so constructed that the cars can be lowered to the boats at any ordinary stage of water; and by means of a movable bottom in the cars, the coal is transferred to the boats without the usual breakage.

Another tipple constructed on the same plan, as that first described, was built by the same company in 1854, at a point 300 yards below the mouth of the run, and its place was supplied in 1868 by the one now being used; which is also arranged for loading into boats only. The elevation of tipple floors above low water is about thirty feet.

An analysis of the coal from the Enterprise Mine, recently made by O. Wuth, Analytical Chemist of Pittsburgh, shows it to contain as follows:

Water,	0.41 %
Volatile matter,	84.10 "
Fixed carbon,	59.13 "
Sulphur,	1.12 "
Ash,	5.20 "
	99.96
	99.96
Coke,	63.54 %
Ash in coke,	8.12 "
Sulphur in coke,	0.92 "

168. VENTURE MINE.

Located at Banksville, on Little Saw-Mill Run, two and three quarter miles by rail south from the Ohio river.

Owned and opened by the late James Woods in 1854. He operated and sold the property to Gray & Bell, the present operators, in 1872.

The workings of this mine are connected with those of

the *Chess* mine, also owned by Gray & Bell; and both mines are ventilated by means of a *fan* made on the Guibal plan.

They employ 160 miners, 30 day men and 10 drivers, and the output is about 10,000 bushels of lump coal per day.

A small portion of the coal from this mine is run to the river trade, over the line of the Little Saw-Mill railroad, and the larger portion is transported over the line of the same railroad to the mouth of Saw-Mill run, where connection is made with the line of the Pittsburgh and Lake Erie railroad, which it passes over to the Lake trade and western markets.

The following columnar section was obtained :

	Carbonaceous shale.			
	Coal and shale mixed,	1'	2"	
	Carbonaceous shale,	0	6	
Venture mine Section. (Fig. 68.)	Coal,	0	2	
	Parting,	0	↓	
	Coal,	0	4½	
	Clay parting,	0	2	
	Coal with slate binders,	0	9	
	Parting,	0	↓	
	Coal,	0	3	
	2d over-clay,	0	2	
	Coal,	0	10	
	Parting,	0	↓	
	Coal,	0	3	
	Over-clay,	0	10	
	Breast coal, {	Coal,	2	2
		Carbonaceous shale,	0	2
		Coal,	0	11
	Parting,		0	↓
	Bearing-in coal,		0	4
	Parting,		0	↓
Brick coal,		1	0	
Parting,		0	↓	
Bottom coal,		1	2	
	Under-clay.			

The two-inch parting of carbonaceous shale, in the Breast coal member, commences at a *swamp*, five feet in depth, and extends in a belt of 50 yards in width, by 125 yards in length. This parting is called a *flat spar* by the miners.

A *soot vein* occurs at this place, in the roof coal members, which gives off *fire damp* in considerable quantity, sufficient to cause a serious explosion, in case it was allowed to remain in the working places, for a day or more.

The *main over-clay* varies from 10 inches to 6 feet in thickness. This condition is found extending throughout the mine, in a belt 300 yards in width, on a bearing of south 20° east.

The *Second over-clay* is found to vary from a mere parting to one foot in thickness, extending across the mine in the same direction as the belts in the main over-clay.

Cleavage bearings were obtained as follows :

N. 64 $\frac{3}{4}$ W. 6 feet—N. 67 $\frac{3}{4}$ W. 6 feet.

N. 61 $\frac{1}{2}$ W. 4 “ —N. 64 W. 3 “

169. COAL RIDGE MINE.

Located on Little Saw-Mill run, 2 $\frac{7}{10}$ miles by rail from the Ohio river.

Owned and opened by A. Kirk Lewis, in 1857, and operated by him until 1860; when it was leased to Alexander Crumby until 1862. It was then sold to Gray & Bell, the present owners and operators.

The coal is shipped principally to the Lake trade, over the lines of the Little Saw-Mill Run, and Pittsburgh and Lake Erie railroads.

They employ at present 36 miners, 3 drivers and 6 day men, and the daily output is 2000 bushels of lump coal.

170. ECLIPSE MINE.

Situated on the line of the Little Saw-Mill Run railroad, two and a half miles south from the Monongahela River.

Opened in 1879 by John Carlin & Co., who are the present owners and operators.

The coal of this mine is transported over the Little Saw-Mill Run railroad, and over the Pittsburgh and Lake Erie railroad to Cleveland, and the Lake trade.

An area of fifty acres has been mined out, and the portion remaining is mainly in the form of ribs and pillars, which they are now mining, and reported to amount to about 20 acres.

They make four grades of coal ; lump, nut, pea and dust.

The dust is washed and made into coke. They have sixteen ovens which are located at the mouth of the run in Temperanceville.

They employ 110 miners, 8 drivers, 1 trapper and 10 day men, and the output averages 8000 bushels of lump coal per day.

171. CHESS MINE.

Located in South Pittsburgh, on Saw-Mill run, one mile south from the Ohio river.

Opened in 1848 by William Chess, Sr. He operated until 1866, and sold to Gray and Bell, the present owners and operators.

This mine is contiguous to, and connected with the workings of the *Venture* mine, also owned and operated by Gray & Bell.

The coal is taken out at the north end of the field, where it passes down a gravity plane to near the run bed, and thence through a rock tunnel, 1326 yards in length, to Painter's and Singer's Rolling Mills, which are supplied largely from this mine.

Three stationary engines are used to haul the coal from the mine to the mills.

They employ 80 miners, 34 day men, 5 drivers, 7 mules, and the daily output is about 5000 bushels of lump coal.

Cleavage bearings were obtained as follows :

N. 59 W. 3 feet—N. 64 W. 5 feet.

N. 65½ W. 2 “ —N. 60½ W. 3 “

N. 60½ W. 3 “ —N. 63 W. 4 “

172. FOX MINE.

Located in Pittsburgh, South-Side, on a branch of Saw-Mill run, one mile south of the Ohio River.

Originally opened by Charles Leadley in 1852. He operated until 1859, and sold it to James Nimick, who leased

it to E. Bowen. He operated until 1862, when it was leased to Thomas Fox, who is still operating and running a small amount of coal from this place, for the trade of the vicinity.

In 1879 he opened a mine in the opposite side of the hill, which enables him to reach the remaining portion of the Nimick coal, and eleven acres of the Karns tract. About 80 acres have been mined out at both openings.

He employs 45 miners, 3 drivers and 3 day men, and the output averages 2000 bushels per day.

The coal is hauled to the river in road wagons, and sold to the city trade.

The mine is ventilated by furnace power.

The following columnar section was obtained :

	Carbonaceous shale.		
	Block slate,	0' 4''	
<i>Fox mine Section. (Fig. 69.)</i>	}	Coal,	0 5
		Clay,	0 1
		Coal,	0 7
		Parting,	0 $\frac{1}{8}$
		Coal,	0 5
		Clay,	0 4
		Coal,	0 8
		Parting,	0 $\frac{1}{8}$
		Coal,	0 4 $\frac{1}{2}$
		Parting,	0 $\frac{1}{8}$
		Coal,	0 4
		Parting,	0 $\frac{1}{8}$
		Coal,	0 5
		Parting,	0 $\frac{1}{8}$
		Coal,	0 2
		Parting.	
		Coal,	0 1
		Main over-clay,	from 0' 9" to 2 6
		Breast coal,	3 6
		Parting,	0 $\frac{1}{4}$
Bearing-in coal,	0 4 $\frac{1}{2}$		
Parting,	0 $\frac{1}{4}$		
Brick coal,	0 9		
Parting,	0 $\frac{1}{4}$		
Bottom coal,	1 2		
	Under-clay.		

Where the over-clay is more than nine inches in thickness, it is usually separated into two members, by a seam of coal from one to four inches in thickness, and the lower clay member preserves a fairly uniform thickness, of from

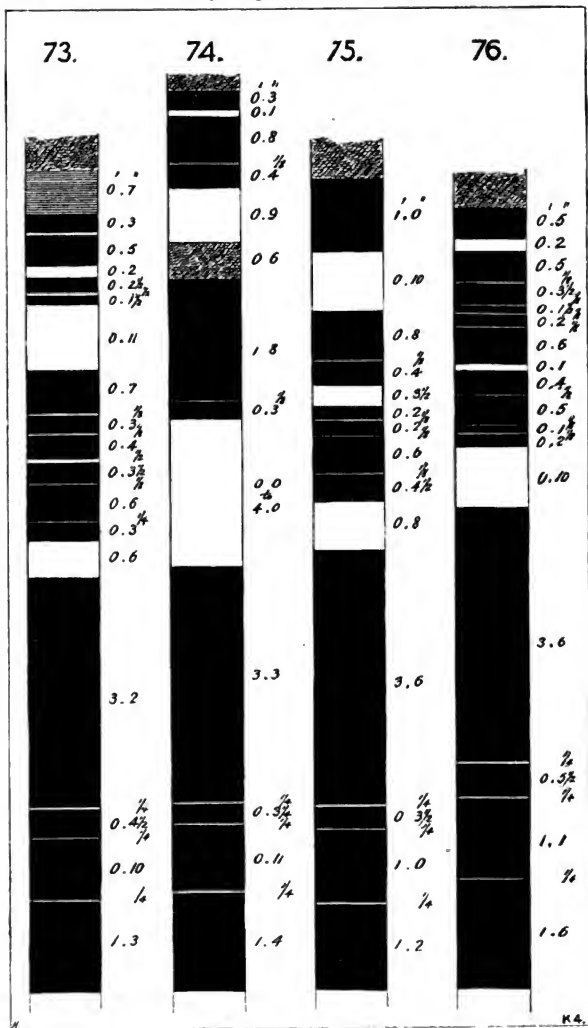
nine to fourteen inches. This lower member is undoubtedly the true over-clay, and the upper member, a swell in the parting over the little roof coal.

The following *cleavage bearings* were obtained :

N. $66\frac{1}{2}$ W. 3 feet—N. $66\frac{1}{2}$ W. 4 feet.

N. $69\frac{1}{4}$ W. 5 " —N. $68\frac{1}{2}$ W. 4 "

N. 69 W. 6 " —N. 67 W. 5 "



CHAPTER IX.

Peters' Creek Mines.

173. VENETIA MINE.

Located at Anderson station, on the line of the Pittsburgh and Wheeling Division of the Baltimore and Ohio railroad, 22½ miles south of Pittsburgh by rail.

Opened up in 1880 by Dr. David M. Anderson. He built a road and tipple and continues to operate the mine.

The following columnar section was obtained :

	Carbonaceous shale.	
<i>Peters' Creek mine</i> <i>Section.</i> <i>(Fig. 70.)</i>	Coal,	0' 6"
	Parting,	0 ¼
	Coal,	0 2
	Clay,	0 2
	Coal,	0 6
	Clay,	0 1
	Coal,	0 3
	Clay,	0 10
	Coal,	0 6
	Parting,	0 ½
	Coal,	0 8½
	Clay,	0 3
	Coal,	0 4
	Parting,	0 ½
	Coal,	0 1
	Parting,	0 ½
	Coal,	0 2
	Main over-clay,	1 0
	Breast coal,	3 4½
	Parting,	0 ¼
Bearing-in coal,	0 3½	
Parting,	0 ¼	
Brick coal,	1 1	
Parting,	0 ¼	
Bottom coal,	1 4	
	Under-clay.	
13 K'.		(193 K'.)

The coal is shipped mainly to the Wheeling market.

The mine is worked on the double entry system, and ventilated by furnace power. By anemometer test the volume of air passing through the workings was found to be 3675 cubic feet per minute.

25 miners, 1 driver and 3 day men are employed ; and the output is 1500 bushels of lump coal per day.

The coal comes from the mine in large *cubical blocks*, has a fine appearance, and bears a good reputation in the market for fuel and gas purposes.

Cleavage bearings were obtained as follows :

N. 64	W. 6 feet	—N. 65½	W. 6 feet.
N. 67½	W. 3 "	—N. 66	W. 3 "
N. 62½	W. 3 "	—N. 62½	W. 8 "
N. 62¼	W. 4 "	—N. 65¼	W. 3 "

174. LOCKHART MINE.

Located on the north side of Peters' creek, on the line of the Pittsburgh and Wheeling Division of the Baltimore and Ohio railroad, 22½ miles south of Pittsburgh by rail.

This mine is just being opened up, and the road and tippie are in course of construction.

The elevation of the bottom of the coal bed at the main pit mouth is 37½ feet above present railroad grade.

It is owned and operated by the Pittsburgh and Peters' Creek Gas-Coal and Coke Company, (Limited), composed of Jacob Householder, R. B. Tate, Charles Lockhart and Thomas McHenry.

A partial section was obtained at the pit mouth, as follows :

Coal.	{	Main over-clay,	0' 10"
		Breast coal,	3 6
		Parting,	0 ¼
Lockhart mine		Bearing-in coal,	0 3
Section.		Parting,	0 ¼
(Fig. 71.)		Brick coal,	0 10
		Parting,	0 ¼
		Bottom coal,	1 3
Under-clay.			



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VENETIA MINE TIPPIE, PETERS CREEK

PHOTOGRAPH BY H. H. HARRIS

The upper portion of the section was not exposed.

The coal bed rises rapidly towards the north, and is reported as rising gently to the east, at this place.

175. LEGLER MINE.

Located on the line of the Pittsburgh Southern railroad, (narrow gauge,) 20 miles south of Pittsburgh by the line of the B. & O. railroad, and one mile north of Finleyville.

Owned and opened up by Jacob Legler in 1879. He built a road and tipple and run coal to the Washington and Wheeling markets.

He leased the mine to Florshim & Young in 1882, who operated until December, 1883, when Young retired from the company and it continues to be operated by Florshim alone, under lease from Legler.

The Baltimore and Ohio Railroad Company, during the last mentioned year, extended a branch from their road at Finleyville out to this mine, and the product of the mine is now run over the line of that road, largely to the Chicago market.

The following partial columnar section was obtained :

Coal.	Main over-clay,	from 0 to 2'	0 "
	Breast coal,	3	0
	Parting,	0	½
	Bearing-in coal,	0	3
	Parting,	0	½
	Brick coal,	1	0
	Parting,	0	½
	Bottom coal,	1	4
	Under-clay.		

The upper portion of the section was concealed.

Bearings on *cleavage planes* were obtained as follows :

- N. 66½ W. 8 feet—N. 67½ W. 4 feet.
- N. 64 W. 5 " —N. 59¼ W. 3 "

30 miners, 2 drivers and 3 day men are employed ; and the output averages 1500 bushels of lump coal per day.

176. PETERS' CREEK MINE No. 1.

Located near Gastonville, on the line of the Pittsburgh and Wheeling Division of the Baltimore and Ohio railroad, $19\frac{1}{2}$ miles south of Pittsburgh by rail.

Opened in 1883 by the Pittsburgh and Chicago Gas-Coal Company. They built a tipple and quite a number of dwelling houses.

40 miners, 2 drivers and 8 day men are employed ; and the output averages 1500 bushels of lump coal per day.

The product of the mine is divided by screening into three grades, *lump*, *nut* and *dust*, and shipped by rail to the Chicago and Western markets.

Bearings on *cleavage planes* were obtained as follows :

N. $62\frac{1}{4}$ W. 3 feet—N. $66\frac{1}{2}$ W. 4 feet.

177. PETERS' CREEK MINE No. 2.

Located on the line of the Pittsburgh and Wheeling Division of the Baltimore and Ohio Railroad, 17 miles south of Pittsburgh by rail.

This mine is just being opened up by the Pittsburgh and Chicago Gas-Coal Company. The product of the mine will be shipped by rail.

CHAPTER X.

*Youghiogheny River Coal Mines.**

178. MILLER MINE.

Located on the west side of the Youghiogheny river, one half mile from its mouth.

Opened in 1839 by Dobbs & Wilkinson, under lease from Caleb Edmundson. They operated for the river trade, and were succeeded successively by A. N. Miller, William Robinson, Reuben Miller, Robert Greenhalgh and William Greenhalgh.

The mine has not been operated since 1872. The balance of the coal remaining has since been mined out through the *Edmundson* mine. An area of 200 acres has been exhausted from both mines together.

179. EDMUNDSON MINE.

Located three fourths of a mile from the mouth of the Youghiogheny river on the west side.

Opened in 1840 by Michael and John F. Dravo, under a lease from Caleb Edmundson. They operated and run coal to the river trade until the mine was exhausted in 1851.

It ranked as one of the most extensive mines in the district, while in operation, having a running capacity of 10,000 bushels of lump coal per day.

*Quite a number of these mines have already been described by Mr. Charles A. Young, in Franklin Platt's report of 1875, on the Coke Manufacture of the Youghiogheny River Valley; see chapter on the Youghiogheny Gas-Coal Trade, volume L, pages 88 to 97; but it has been thought advisable to include in this report re-descriptions of those comprised within that portion of the valley affected by the Slack-Water Improvement during its existence.

180. PENNY MINE.

Located on the west side of the river, one mile from its mouth.

Opened in 1848 by John Penny. He built a tippie, gravity plane and check house and operated to the river trade until 1878, and the property was sold to John B. Sneathon, Frederick Wilson, David Linch and Cyrus Robison, the present operators.

The mine is worked on the single entry system. The butt entries are driven to the outcrop, and entry No. 9 connects with the Robbins and Jenkins mine on the Monongahela river.

They employ 150 miners, 15 drivers and 12 day men; and the output averages 12,000 bushels of lump coal per day.

The following columnar section was obtained:

	Carbonaceous shale.	
	Block slate,	0' 7"
Penny mine Section. (Fig. 78.)	Coal,	0 3
	Parting,	0 ½
	Coal,	0 5
	Clay,	0 2
	Coal,	0 2½
	Parting,	0 ½
	Coal,	0 1½
	Clay,	0 11
	Coal,	0 7
	Parting,	0 ½
	Coal,	0 3
	Parting,	0 ½
	Coal,	0 4
	Parting,	0 ½
	Coal,	0 3½
	Parting,	0 ½
	Coal,	0 6
	Parting,	0 ½
	Coal,	0 3
	Main over-clay,	0 6
Breast coal,	3 2	
Parting,	0 ½	
Bearing-in coal,	0 4½	
Parting,	0 ½	
Brick coal,	0 10	
Parting,	0 ½	
Bottom coal,	1 3	
	Under-clay.	

The block slate rests immediately on the roof coal.

Cleavage bearings were obtained as follows:

N. $66\frac{1}{4}$ W. 4 feet—N. $62\frac{1}{4}$ W. 3 feet.

N. $60\frac{1}{2}$ W. 7 " —N. $64\frac{1}{4}$ W. 3 "

181. JAMES O'NEIL MINE.

Located on the west side of the river, $3\frac{1}{4}$ miles from its mouth.

Originally opened in 1865 by James O'Neil. He built a tippie, a road and gravity plane, to the Major Rankin coal, one half mile from the river.

The coal was hauled to the river by a steam locomotive.

One hundred and forty-eight acres were mined out at this place which was abandoned in 1871, and the road extended to the upper side of the same property, one half mile further up the same run.

Here he built another gravity plane and mined out the balance of the Rankin tract and five acres of the Pierce coal.

He abandoned this place in 1876, and extended the road a quarter of a mile farther up the run, and opened the present mine in the Henderson coal.

About 110 acres of this tract have been mined out, and the workings are being extended through to the west side of Weddle's run, where about forty acres remain unmined.

The cars are hauled to the parting by mules, and from that point they are hauled to the pit mouth by a stationary engine and wire line, a distance of 300 yards; and from there they are run to the river by a steam locomotive.

The old main entry rises from the north end, for a distance of 600 yards, and falls from there through to Weddle's run, a further distance of 550 yards, so that the water at the north part of the mine flows toward the Youghiogheny, and from the south part it flows toward the Monongahela river.

They employ 100 miners, 10 drivers and 7 day men, in-

cluding the engineer and fireman ; and the output averages 9000 bushels of lump coal per day.

The following columnar section was obtained :

	Carbonaceous shale.		
	Coal and shale mixed,	0'	6'
James O'Neil mine Section. (Fig. 74.)	Coal,	0	3
	Clay,	0	1
	Coal,	0	8
	Parting,	0	↓
	Coal,	0	4
	Clay,	0	9
	Carbonaceous shale,	0	6
	Coal,	1	8
	Parting,	0	↓
	Coal,	0	3
	Over-clay,	from 0" to 4	0
	Breast coal,	3	3
	Parting,	0	↓
	Bearing-in coal,	0	3½
	Parting,	0	↓
Brick coal,	0	11	
Parting,	0	↓	
Bottom coal,	1	4	
	Under-clay.		

The main over-clay is absent in a large portion of the mine, and in other parts it varies from six inches to four feet in thickness.

Clearage plane bearings were obtained as follows :

N. 61½ W. 6 feet—N. 62 W. 6 feet.

N. 61¾ W. 5 " —N. 65 W. 6 "

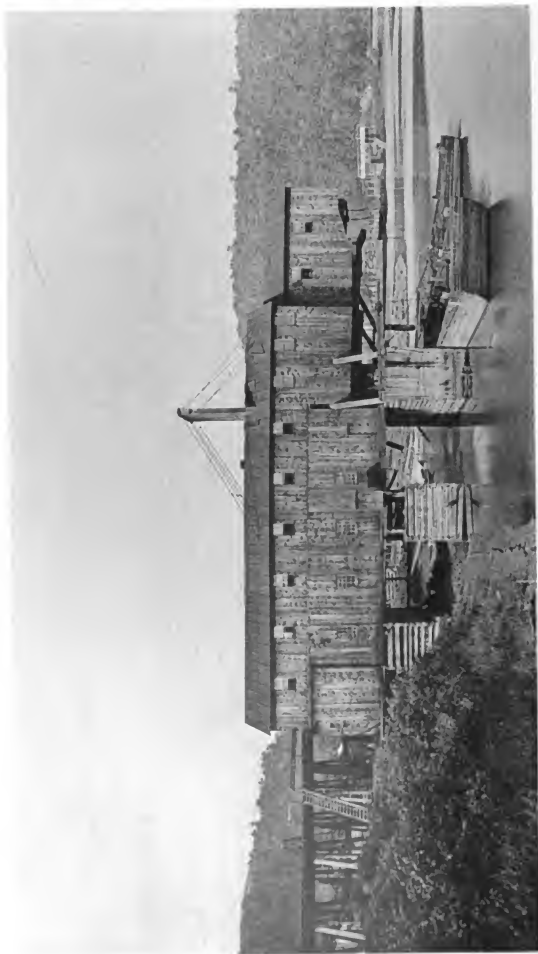
N. 65½ W. 7 " —N. 62½ W. 5 "

N. 60¾ W. 4 " —N. 62¼ W. 3 "

182. CORNELL AND WERLING MINE.

Located at Boston, on the west side of the river, 3¾ miles from its mouth.

Opened in 1865 by Duncan, Cornell & Werling. They built a tippie and gravity plane, and operated to the river trade, until the property was purchased by Wm. H. Brown, since deceased. It is now owned and operated by W. H. Brown's sons.



WESTON

CORNELL AND WERLING MINE TIPPLE, YOUGHIOGHENY RIVER

ALCOTT'S PRINTING CO.,

The mine is worked on the single entry system. The main entry is driven through to Wild-cat run, a distance of 1600 yards, and continued 140 yards farther into the second hill.

The butt entries are driven through the field, so that the water will flow to the main entry, and thence out, through it, to Wild-cat run. The entries are all driven eight feet wide.

The coal is hauled, from the working places, by mules, to the parting on the main entry, 1200 yards in the mine, and from there the cars are hauled out of the mine by means of a stationary engine and wire line, located near the pit mouth. The empty cars are returned by gravity.

The loaded cars run by gravity from the pit mouth to the river, a distance of one mile, and the empty ones are hauled back by means of another stationary engine and wire line.

The coal is screened at the river, into three grades, *lump*, *nut* and *dust*.

They wash considerable quantities of the dust, and sell it for manufacturing *coke*.

The engine that hauls the cars from the mine has a 10-inch cylinder and 2-foot stroke, and the engine that is used to haul the empty cars from the river, has a 12-inch cylinder and 2-foot stroke. They are now using a battery of four boilers each 40 feet in length, and 40 inches in diameter, to supply the required amount of steam.

The mine is ventilated by means of a *furnace* and stack. The furnace is built with a double arch $6\frac{1}{2}$ feet wide, 6 feet from grate bars to underside of first arch, and 3 feet more to underside of second arch. It is 30 feet in length and rises from front to rear. The grate bars are placed at an elevation of 3 feet above the floor. The fire bed is composed of two sets of bars $5\frac{1}{2}$ feet each in length. The front of the fire bed is placed 8 feet from front of furnace. The stack is built of brick $6\frac{1}{2}$ feet square on the inside and 80 feet in height.

They employ 200 miners, 10 drivers and 35 day men, and the output averages 16,000 bushels of lump coal per day.

The following columnar section was obtained :

	Sandy shale.		
	Carbonaceous shale,	2'	6 "
Cornell and Werling mine Section. (Fig. 75.)	{	Coal,	1 0
		Clay,	0 10
		Coal,	0 8
		Parting,	0 $\frac{1}{2}$
		Coal,	0 4
		Clay,	0 3 $\frac{1}{2}$
		Coal,	0 2
		Parting,	0 $\frac{1}{2}$
		Coal,	0 2 $\frac{1}{2}$
		Parting,	0 $\frac{1}{2}$
		Coal,	0 6
		Parting,	0 $\frac{1}{2}$
		Coal,	0 4 $\frac{1}{2}$
		Main over-clay,	0 8
		Breast coal,	3 6
		Parting,	0 $\frac{1}{2}$
		Bearing-in coal,	0 3 $\frac{1}{2}$
		Parting,	0 $\frac{1}{2}$
Brick coal,	1 0		
Parting,	0 $\frac{1}{2}$		
Bottom coal,	1 2		
	Under-clay.		

Swells or *horsebacks* are quite frequent between the first and second roof members in a large portion of the mine ; and where this condition is found, they endeavor to retain the over-clay in place by frequent posting, in order to save handling the extra quantity of clay. They mine out about six inches of the bottom coal member in the entries, and traveling roads of the rooms, for the purpose of giving more height to the traveling ways. This portion of the bottom coal is reported to be quite free from *sulphur* and *binders*, and is shipped to market with the other coal.

The following *cleavage bearings* were obtained :

N. 62 $\frac{3}{4}$ W. 4 feet—	N. 61 $\frac{1}{4}$ W. 3 feet.
N. 63 $\frac{1}{2}$ W. 4 "	—N. 61 $\frac{1}{2}$ W. 3 "
N. 64 $\frac{1}{2}$ W. 6 "	—N. 62 W. 5 "
N. 66 W. 4 "	—N. 65 $\frac{1}{2}$ W. 12 "
N. 65 $\frac{1}{2}$ W. 5 "	—N. 65 W. 4 "
N. 63 $\frac{1}{2}$ W. 5 "	—N. 64 W. 5 "

Elevation of bottom of coal at the pit mouth is reported to be 266 feet above low water.

An area of 450 acres has been mined out at this place.

183. OSCEOLA MINE.

Located on the east side of the river, at Osceola station, on the Baltimore and Ohio railroad, and is operated by the Osceola Coal Company.

The coal is run from the pit mouth down a gravity plane to the tipple at the railroad; and the product of the mine is shipped by rail.

The mine is worked partly on the single entry, and partly on the double entry systems.

130 miners and 20 day men are employed; and the output averages 8000 bushels of lump coal per day.

184. ALPSVILLE MINE.

Located at Alpsville, on the east side of the river, $6\frac{1}{2}$ miles from its mouth.

Opened in 1864 by N. J. Bigley.

The coal was shipped over the line of the Baltimore and Ohio railroad to a point a short distance above McKeesport, where it was transferred to barges and boats, and run to the lower river markets.

The slack coal was washed and made into a very beautiful article of *coke*.

Bigley operated until 1880, and was succeeded by Thomas Hackett & Co.

They employ 130 miners, and the product of the mine is shipped by rail.

185. EAGLE-NEST MINE.

Located on the west side of the river, $7\frac{1}{2}$ miles from its mouth.

Opened in 1850 by David Allen and John Mierhoof, who operated to the river trade until 1857. It then remained idle until 1876, and was sold to William Duncan and John Lamb, who operated by river until 1881, and sold to the Greenoak Coal Company, consisting of William Ratcliff,

Thomas Painter, Robert Jack, J. H. Dewees and John Shields.

They are the present operators, and run the product of the mine by both river and rail.

An area of about 75 acres has been mined out.

186. McQUISTON MINE.

Located on the west side of the river, 8 miles from its mouth.

Opened by Richard McQuiston. He operated to the river trade until the slack-water was suspended in 1866, and the property since passed into possession of Duncan & Cornell. It remains unoperated.

187. RUPERT MINE.

Located on the west side of the river, 8 $\frac{1}{2}$ miles from its mouth.

Opened in 1860 by Riley Rupert and Coonrod Smith. They operated to the river trade until 1862, and were succeeded by Robins & Jenkins, who operated until 1863, and the property was sold to Robert Long.

He operated until the suspension of the slack-water in 1866, and the mine has remained idle since that time.

188. OLD ALPS MINE.

Located on the west side of the river, 8 $\frac{3}{8}$ miles from its mouth.

Opened by the Alps Coal Company. They operated to the river trade until 1862, and were succeeded by N. J. Bigley, who operated until 1863, and the mine has remained idle since then.

189. COULTERVILLE MINE.

Located opposite to Coulterville on the west side of the river, $8\frac{3}{4}$ miles from its mouth.

Opened in 1851 by Robert, John and Henry Duncan, Robert Cornell and Andrew Werling.

They built a slide tippie, gravity plane and check house, on the face of the river hill, and operated to the river trade until Dam No. 1 was destroyed by ice in 1866, when the mine was abandoned.

An area of 75 acres was mined out at this place.

190. CIERA MINE.

Located on the west side of the river, $9\frac{1}{4}$ miles from its mouth.

Opened in 1856 by William, Charles and Anthony Dravo. They operated to the river trade until 1860, and were succeeded by N. J. Bigley and J. V. McDonald, who operated under lease until 1864; when McDonald retired from the firm and Bigley continued to operate until 1865, and the mine has remained idle since then.

191. SCOTCH-HILL MINE.

Located on the east side of the river, near Robbins' station, on the Baltimore and Ohio railroad.

Opened by William Robbins and Robert Jenkins in 1855. They run coal to the river trade until the Dams were destroyed and navigation suspended.

192. BLYTHE MINE.

Located on the east side of the river, one third of a mile above the *Scotch-Hill* mine.

Opened by John Blythe & Co. They built a railroad tippie, and run coal by rail.

193. WHITE-BALL MINE.

Located on the east side of the river, at Shaner station, on the line of the Baltimore and Ohio Railroad.

Opened by the Old Alps Coal Company.

They built a tippie and run coal by rail until 1862, and were succeeded by Thomas Moore, who operated until 1878. He was succeeded by the Youghiogeny Coal Hollow Coal Company.

Elevation of bottom of coal bed here reported at 50 feet above water level.

The slack coal produced is washed and made into a very beautiful article of coke.*

194. SHANER MINE.

Located a little south of Shaner station, on the line of the Baltimore and Ohio Railroad.

Opened in 1883 by Armstrong & Rafferty. They are operating the Hayes coal in connection with the balance of the Armstrong tract.

They employ 137 miners and 17 day men, and the product of the mine is run by rail.

195. STRINGTOWN MINE.

Located on the west side of the river, near Stringtown station, on the Pittsburgh, McKeesport and Youghiogeny railroad.

Opened in 1857 by the Stringtown Coal Company, composed of Joseph, Thomas, Richard and Watson Muse, Cooper Wilson, Edward Davis and John Ingles.

They operated to the river trade until 1861, and the mine remains idle.

An area of 30 acres is reported to have been mined out.

* A description of the machinery used in washing the slack coal is given by Mr. Charles A. Young in Volume L, page 91, of the reports of the Second Geological Survey of Pennsylvania.

196. CHARLESTON MINE.

Located on the west side of the river, one third of a mile above the *Stringtown* mine.

Opened in 1858 by Charles Dravo, who operated to the river trade until 1860, and was succeeded by A. G. McGrew, who operated the mine under lease until 1865, and it has remained idle since then.

197. BUENA VISTA MINE.

Located at Buena Vista, on the west side of the river, 11 $\frac{3}{4}$ miles south from its mouth.

Opened in 1883 by the South-West Coal Company, composed at present of E. C. Converse, O. D. Delano, B. F. Rafferty, J. H. Dewees, John Shields and William Duncan.

They built a railroad tipple and gravity plane, and run the product of the mine to the National Tube Works at McKeesport, and to the Lake trade, over the line of the Pittsburgh, McKeesport and Youghiogheny railroad.

The gravity plane is 900 feet in length and has a fall of 27 feet in that distance. The full cars in passing down the plane haul the empty ones back to the pit mouth, by means of a hemp line, one and a quarter inches in diameter, and a drum wheel stationed at the last-named point.

The elevation of the tipple floor above railroad grade is 25 feet, and 50 feet above the surface of the river; which makes the elevation of bottom coal at pit mouth 77 feet above the river, and 52 feet above railroad grade.

This mine is worked on the double entry system, and the entries are driven eight feet in width.

They employ 95 miners, 4 drivers and 6 day men, and produce 200 tons of lump and nut coal mixed per day.

A *fault* crosses entry No. 2, which dislocates the coal and associated strata one foot, and produces a *soot vein* along its entire course.

The following columnar section was obtained :

	Sandy shale.		
	Carbonaceous shale,	2'	0'
Buena Vista mine Section. (Fig. 76.)	}	Coal,	0 5
		Clay parting,	0 2
		Coal,	0 5
		Parting,	0 ½
		Coal,	0 3½
		Parting,	0 ½
		Coal,	0 1½
		Parting,	0 ½
		Coal,	0 2
		Parting,	0 ½
		Coal,	0 6
		Clay parting,	0 1
		Coal,	0 4
		Parting,	0 ½
		Coal,	0 5
		Parting,	0 ½
		Coal,	0 1
		Parting,	0 ½
		Coal,	0 2
		Main over-clay,	0 10
Breast coal,	3 6		
Parting,	0 ½		
Bearing-in coal,	0 5½		
Parting,	0 ½		
Brick coal,	1 1		
Parting,	0 ½		
Bottom coal,	1 6		

Under-clay with limestone nodules.

Clearage bearings were obtained as follows :

N. 61	W. 8 feet	—	N. 62	W. 4 feet.
N. 64	W. 6 "	—	N. 60½	W. 7 "
N. 60¾	W. 5 "	—	N. 61½	W. 10 "
N. 63¾	W. 3 "	—	N. 56¼	W. 4 "
N. 65	W. 6 "	—	N. 57	W. 5 "
N. 62½	W. 5 "	—	N. 64½	W. 6 "

198. ARMSTRONG MINE.

Located on the east side of the river, at Armstrong Station, on the Baltimore and Ohio railroad.

Opened in 1856 by Bell & McCune, who operated to the river trade until 1858, and were succeeded by the Fulton

Brothers. They also operated and run the coal to the river trade, until the suspension of the slack-water.

The property was purchased by C. H. Armstrong in 1866, who built a railroad tipple, and shipped the coal by rail until the beginning of the present year (1884).

The property now belongs to Charles Armstrong, Jr., and B. F. Rafferty, who are running out the remaining portion of the coal at the Shaner Mine, owned by the same parties.

199. BRINTON MINE.

Located a quarter of a mile south of Armstrong's Station, on the Baltimore and Ohio railroad, on the east side of the river.

Opened in 1856 by Joel Brinton. He operated to the river trade until 1859, and was succeeded by Jones & Laughlin.

They built a railroad tipple, and shipped the product of the mine to the *Eliza furnace*, which they own and operate at Pittsburgh. The mine has not been in operation since 1866.

An area of 25 acres has been mined out at this place.



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